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What Will Mr. Pybus Do?

WE are in the fortunate position of having as Minister of Transport in the National Government a man who ought to understand the electrical industry better than any other member of the Government and better than his predecessor in office.

The need for there being more engineers, and especially electrical engineers, in political life has often been expressed. Now that we have one in high authority, what will he do with the opportunity and the responsibility thus thrust upon him? What *will*, what *can*, Mr. Pybus do electrically?

Though political office requires the sacrifice of company directorships, it cannot deprive a man of the knowledge of a lifetime. And whatever newspaper and other businesses Mr. Pybus may have been connected with, it has been with the electrical manufacturing industry that he has been mainly concerned. We are justified in assuming that in his recent career he knew the question of electricity supply and railway electrification by heart.

As Minister of Transport he has necessarily had to divest himself of his private cloak and adorn himself with ministerial uniform. Likewise, he must be prepared to adapt his attitude according to such disparity as he discovers to exist between the official and the private knowledge of, and ideals in, electrical affairs.

When taking up the work of a zealous predecessor he naturally found the influence of Mr. Morrison lingering around the business of the Ministry, and everybody electrical has reason to be grateful to Morrison of Hackney for the energetic way in which, during his period of office, he gave expression to his enlightened view of the place of electricity in the common life. He had an electric house, and he didn't mind talking about it. His round of provincial visits and his boosting speeches did a great deal of good. That they roused the envy of the gas opposition was but a compliment to him for daring, in his official capacity, to show that he knew that electricity was *the* thing.

He had served his time in the Robinson School at Hackney as a councillor and committee-man, and had first-hand knowledge of what a "live" development policy—given a free course—could accomplish. We believe that the electrical movement misses him to-day.

Mr. Pybus comes into authority with more specialised technical and financial knowledge. Will he continue along the lines mapped out by Morrison or, possibly better still, produce a broader policy of his own? He had not been long enough in the saddle, and perhaps it is too early to ask him, to give a definite lead to his special industry, but it is the most natural thing in the world for us to look in his direction for action.

The Electricity Commission and the Central Electricity Board are objects of his peculiar care. The anxiety of the Board regarding the need for a more progressive electricity policy has been mentioned by the President of the Electrical Development Association, and we have done our best to encourage electricity supply undertakings to get a move on with schemes for increasing the domestic and the industrial loads.

To the new Minister of Transport we look for official influence in these matters as well as in that relating to railway electrification. By expediting progress he will be helping to lighten the national burden.

Anti-Dumping Orders

THE publication of the first Order issued by the Board of Trade under the Abnormal Importations Act has been followed by further announcements by firms who are making arrangements for manufacturing their goods in this country. Several interesting references will be found in our "Business and Industrial Notes." The second Order was issued on Monday last and comes into force to-day. It provides for the imposition of a duty of 50 per cent. *ad valorem* on battery carbons, of which many millions per month have been brought in. They have not a separate classification in the trade returns, but appear under the general heading "Electric carbons other than for lighting and furnaces."

The National Canvass

WE wish to direct attention to the important article by Mr. W. E. Swale on page 839. Readers are invited to examine carefully the definite proposals which he advances at the end of the contribution, and to communicate their views to us for publication.

Shop Window Lighting

DURING these shopping weeks electrical contractors who are critically minded can spend a profitable evening hour or two in almost any public thoroughfare. A wander abroad affords an education of both how shop lighting ought and ought not to be done. In their eagerness to display their goods impressively shopkeepers sometimes produce lighting effects which irritate the eyes and divert the attention of the public from the very thing that they want to see. It may be that the contractor has been at fault, or that he has had to pander to the shopkeeper's ignorant craze for glare and blaze. The illumination of shop windows and stores has, however, shown remarkable improvement in recent years, thanks to the thousand-and-one different effects that can be obtained with electrical illumination. Tubular outline and general electrical sign work is becoming very pleasing—it is a branch of the contractor's work that possesses wonderful possibilities.

Misplaced Blame

IN our issue of November 20th (p. 777) we published a letter from a Birmingham reader complaining that in none of the Birmingham Corporation's houses was provision made for a power circuit. He blamed the Electric Supply Department, but Mr. E. J. Jennings, the secretary and commercial manager of the Department, says that the blame is misplaced. This Department has been pressing the House Building Committee for some considerable time to install provision for power supplies in all Corporation houses, and at last has succeeded in persuading the Committee to install "a small power plug" in future houses. We are glad to place the actual facts on record, and wish to express the hope that the House Building Committee will relax still further in the near future in the best interests of its tenants.

Company Matters

THE financial affairs of a number of electrical and allied companies have been to the fore during the last few days; they have included two new issues of capital and three unsatisfactory dividend announcements. The Galloway Power Company published a prospectus offering £1,400,000 five per cent. debenture stock at 93 (see our Financial Section), but it is understood that the underwriters had to take up about 90 per cent. The Associated Electrical Industries, Ltd., is at this moment offering a substantial issue of ordinary shares to its existing ordinary shareholders in order to redeem a like amount of seven per cent. mortgage debenture stock of the B.T.H. Co. The Associated Company is making good progress with the co-ordination of the activities of its different companies; and this financial measure will facilitate such operations. With more settled political conditions a trade revival is anticipated, and the profits of the current year are expected to be substantially the same as for 1930.

Difficult Days

OTHER companies are finding the times very difficult, for the directors of Petters, Ltd., have deferred consideration of the payment of an interim dividend on the preference shares for three months, while the Electric Construction Co., Ltd., has left over until March the consideration of the question of preference dividend distribution, and the Globe Telegraph and Trust Co. for the second time is passing the quarterly interim dividend on its ordinary shares. A Press dispatch from Geneva reports that Escher, Wyss & Co., of Zurich, are in difficulties in consequence of the economic crisis. Payment of the November coupons is to be deferred.

The Cost of a Patent

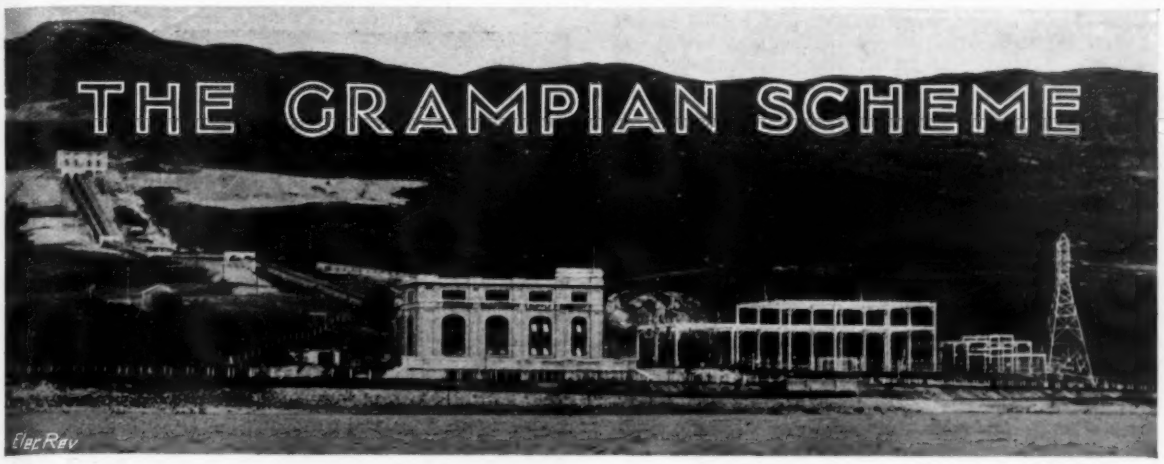
WHO can imagine the number of useful inventions which have failed to pass beyond the mental conception stage, or the preliminary conversational or rough drawing stage, because of the cost of proceeding further and securing a patent? A brilliant stroke of genius has given birth to great discoveries in the past, and will do so again, but intensive research in the special departments of big industrial companies yields more in these days. In both cases, however, the subsequent procedure may be obstructively costly. Mr. A. S. Cachemaille, president of the Chartered Institute of Patent Agents, holds that the Government could encourage invention and industrial progress by granting cheaper patents instead of treating them as a source of revenue. In his view, lower charges would stimulate invention and help us to keep ahead of foreign rivals. The point could be argued with greater force at a time when the national purse bulged a little more prosperously.

Women in Industry

FLUCTUATIONS in the employment situation in France have been commented upon here from time to time. Not so very long ago she was importing skilled workers to help in a time of exceptional activity when in England men of the same class were eagerly on the look-out for work. Our notes excited interest and some men crossed the Channel in the hope of finding engineering occupation with electrical manufacturers. To-day the French position is very different. Our Paris correspondent, in reporting upon recent events, says that things have become so disquieting that it has been seriously proposed that female labour shall be restricted by legislation; indeed, that it shall ultimately be entirely suppressed in fields which were formerly occupied by men.

Where They Are Needed

IT is argued that workshop and even office employment is physically undesirable for women. In Britain female labour has for very many years—almost from the very start of some sections of electrical industry—been satisfactorily employed in the production of electric lamps, accumulators, instruments, armature-winding, wire-covering, and all kinds of assembling. With us, at any rate, this is not work *formerly* done by men. Desperate times, of course, call for desperate remedies. Our industrial depression has automatically reduced the employment of women in some factories, but in many the deftness of the female fingers and the natural aptitude of the sex for certain kinds of work are so necessary that displacement would create an economic problem no less difficult to solve than that of general unemployment. In office life, in electrical showrooms, and as house-to-house electrical canvassers, too, what should we do without them? And what would the E.A.W. say about it?



Harnessing the Highlands Water Power

AFTER reading and writing of a good many of the large and wonderful water-power electricity generating schemes abroad, it was stimulating recently to see what has been and is being done in hydro-electric work in the Perthshire Highlands by the Grampian Electricity Supply Co. under the powers granted in the Grampian Electricity Supply Act of 1922.

The whole scheme, representing some of the world's finest engineering—civil, mechanical and electrical—was designed and is being constructed by Messrs. Balfour, Beatty & Co., Ltd. It provides for, ultimately, four generating stations:—The initial completed development at Loch Rannoch, which has been in operation for just about a year; one now in course of construction at Tummel Bridge, west of Loch Tummel; and others not in immediate contemplation at Bruar Water and on the River Garry between Blair Atholl and Struan.

The Rannoch station is situated on the northern shore at the western end of the loch and has an initial normal plant capacity of 32,000 kW; provision is made for a third 16,000-kW turbo-alternator set. It receives its water from Loch Ericht under a maximum head at present of 497 ft., and its tail race is in direct communication with Loch Rannoch.

River Ericht is dammed at a point about a mile from the Loch Ericht entrance, and from the loch to the dam an open cut has been constructed so as to provide a minimum water depth of six feet at the dam. The damming has resulted in a maximum water level at the loch of 1,165 ft. above ordnance datum.

Standing on the dam it was curious to see so little water behind such a great wall, but we were reminded that the greater part by far of the loch's 17 miles' length of water was nearly normal to the open cut and obscured by the hills.

Water Control

The dam is a concrete structure, about 1,400 ft. long and 34 ft. (maximum) wide, with expansion joints and provision for further raising the level of the loch by 15 ft. in future. Regulation of the present water level can be effected by a suitable scour gate.

Double sets of large-mesh screens at the intake shaft facilitate cleaning, and for sealing the tunnel conveying the water from the dam there is a roller gate about 15 ft. by 8 ft. wide. This gate descends under gravity with centrifugal-clutch control.

The 12-ft. diameter tunnel has been bored through the hills Sron Bheag and Meall Gorm in solid granite in a south-easterly direction to the valve house situated about three-quarters of a mile from the power station; at the point where the tunnel crosses the river a short pipe is inserted to provide for the " above-ground " section. It is about 2¼ miles long and has a maximum level difference of from 1,072 ft. at the bottom of the vertical intake shaft, at the dam end, to 1,026 ft. at the valve house.

Two catchment aqueducts divert water from neighbouring rivers to the system, one from River Allt Ghlas to behind the dam, and another from River Allt Mhengaidh to a down-shaft to the tunnel at a point between the two hills mentioned. Other minor damming and catchment works have been, or are to be, constructed at various parts. This down shaft provided two additional faces from which boring operations were conducted.

At a point about 700 ft. from the valve house there is a vertical surge shaft leading to the tunnel. It has two diameters, 12 ft. at the bottom and 45 ft., and serves to absorb back pressure in the event of load being suddenly taken off the turbines. From the surge shaft to the valve house the tunnel divides into two legs. Two 8-ft. pipes at present connect the valve house and the station, but there is provision for two more.

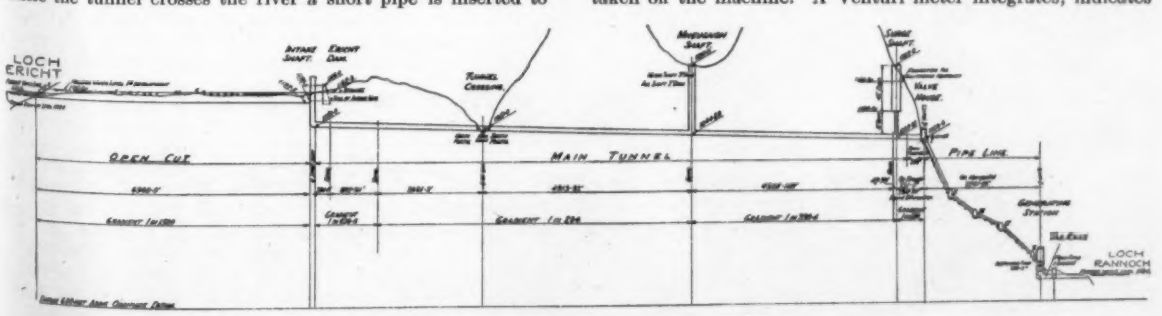
The pipe seatings are on rollers to allow for expansion, there being four expansion joints in each pipe. The pipes were supplied by the South Durham Iron and Steel Co., Ltd. A valve electrically and remotely controlled from the switchboard and a hand-operated valve are arranged in series on each pipe line in the valve house, and the electrical valves are arranged for automatic closing in the event of excess water flow. In the station electrical instruments supplied by Messrs. Isenthal & Co., Ltd., record the water levels of Lochs Ericht and Rannoch and of the surge shaft and tail race. The valves and tunnel-sealing gate were supplied by Messrs. Glenfield and Kennedy, Ltd.

The water supply to each turbine is controlled by an Escher Wyss rotary valve fitted with automatic closing arrangements for operation should the water velocity exceed the normal by more than 50 per cent. It may also be closed electrically from the switchboard in case of emergency.

Turbine Equipment

The two turbines, supplied by the English Electric Co., Ltd., are of the vertical, high-pressure reaction type with Francis phosphor-bronze runners. They have a full-load capacity of 22,000 h.p. each at 500 r.p.m. About 370 cusecs of water is passed by each machine when loaded at 12,000 kW. With the present water head the full-load capacity of each machine is about 19,000 h.p.

To prevent water hammer a relief valve automatically opens and by-passes the water in the event of load being suddenly taken off the machine. A Venturi meter integrates, indicates



Sectional arrangement of the Loch Ericht development

and records the flow of water through each turbine runner.

The vertical movement of the pendulum of the governor, belt-driven from the turbine shaft, is transmitted to a pilot valve which admits oil to either side of the piston of a servo-motor. The piston is geared to a regulating shaft which in turn is linked up with the turbine gates. Electrically driven pumps maintain the oil pressure for the servo motors at 215 lb. per sq. in., while a Pelton-wheel pump is installed as a stand-by.

Failure of the oil system is immediately indicated by alarm devices on a special board with similar equipment for other essential services. The servo-motor is situated on the operating floor at the alternator level, while the regulating shaft and links are in the basement at the turbine level.

The governor equipment on one machine was supplied by the English Electric Co., Ltd., and that on the other by Boving and Co., Ltd. Remote speed control for the turbines is provided for from the switchboard, and there are automatic devices for shutting the machine down in the event of over- and under-speeds and governor-belt breakage.

Each complete rotor unit (turbine, alternator and exciters) weighs 55 tons, and the water thrust when starting up adds to this probably another 50 tons. The whole of this weight is taken by a Michell thrust bearing at the machine top. This runs in a bath of oil in which is submerged for cooling a heavy copper coil of many turns, water being circulated through the coil by a pump driven from the main shaft which also serves two guide bearings.

A turbine wheel

An electrically driven pump controlled by a "Monitor" valve is automatically brought into operation in the case of failure of the main pump. Compressed-air brakes bring the rotating masses to rest in five minutes after the water is shut off. This braking equipment was manufactured by Westinghouse Brake & Saxby Signal Co., Ltd.

The Electrical Equipment

The alternators are of standard construction and were supplied by the British Thomson-Houston Co., Ltd. They have a full-load capacity of 16,000 kW at 0.8 p.f. and generate at 11,000 V. Main and auxiliary (stabilising) exciters are carried on the main shaft, and the excitation system is designed to enable the machines to charge up long transmission lines. The voltage can first be reduced to 6,000 V by the main exciter field, and then to zero by a reversible potentiometer.

The alternators are designed to work satisfactorily over a wide range of voltage and up to a maximum of 12,500 V, so that when working in conjunction with the booster Tirrill regulators and dual exciters quick voltage adjustments may be made. They will give their rated kVA down to a power factor of approximately 0.65 lagging, and they will also deliver 14,000 kVA at zero leading current. The generators supply an 11,000-V duplicate bus-bar switchboard, which is equipped throughout with motor-operated switchgear having a breaking capacity of three-quarters of a million kVA.

Thermo-couples and remote indicators supplied by Messrs. Elliott Bros. (London), Ltd., are used for temperature readings at six points of each alternator winding and at the three bearings.

The main switch and control gear are standard B.T.-H. equipment, the switches, installed in stone cubicles below the control panels, being remotely and electrically operated by a supply from a 110-V station battery which also supplies pilot-

Turbine governor equipment

house lighting, etc. There is also a 440-V switchboard for the house supply.

The control floor is some 20 ft. above the machine (alternator) floor, and from it there is a commanding view of the station interior. Each machine panel is fitted with a Tirrill voltage regulator as well as Merz-Price protection equipment.

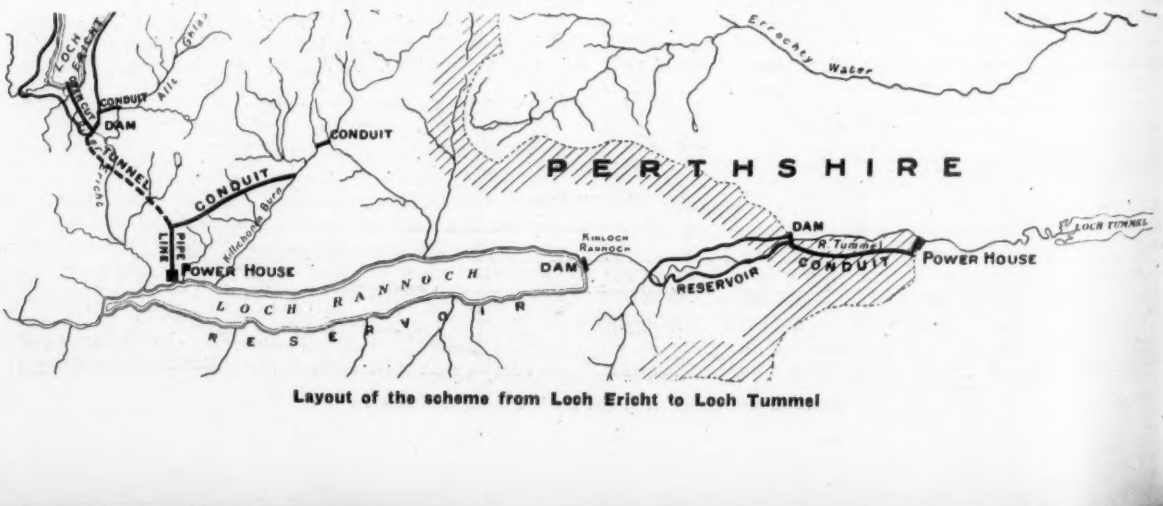
The station building is an imposing structure built of precast concrete blocks, made on site, giving a stone-like appearance. It measures 60 ft. wide, 98 ft. long and 50 ft. high. Culverts at the base of the building would allow the water to flow right through beneath the structure should a burst occur in the pipes. A 50-ton electric crane supplied by Messrs Royce, Ltd., spans the interior. Adjacent to the power house there is an up-to-date workshop equipped with machine tools, etc.

From the station, supplies at the generating pressure are conveyed to a 132-kV and a 33-kV outdoor substations at the east side of the building. As there is no control within the station at the higher pressures these stations will be classed as part of the transmission system, but the main transformers in the 33-kV "sub" are fitted with tertiary windings to afford a 2,200-V supply back to the station for the auxiliaries.

In order that the advantages of a duplicate supply may be obtained without paralleling these transformers through the third or intermediate windings, automatic change-over switchgear is installed so as to ensure that if either transformer is alive, a low-pressure supply is available from this source. Arrangements have also been made so that should future requirements demand it an alternator may be installed and coupled to an existing Pelton wheel so that a third l.p. supply will then be available without the necessity of coupling small transformers to high-breaking-capacity switchgear.

A transformer in the building reduces the pressure of the supply to 440 V. There is also a reversible motor-generator for supplying the auxiliaries in the event of a total supply failure, and this also serves for charging the batteries.

The power requirements during construction were met by a temporary power station with two 400-kW turbo-alternators operated under a head of 135 ft. by the water of River Ericht.



Layout of the scheme from Loch Ericht to Loch Tummel

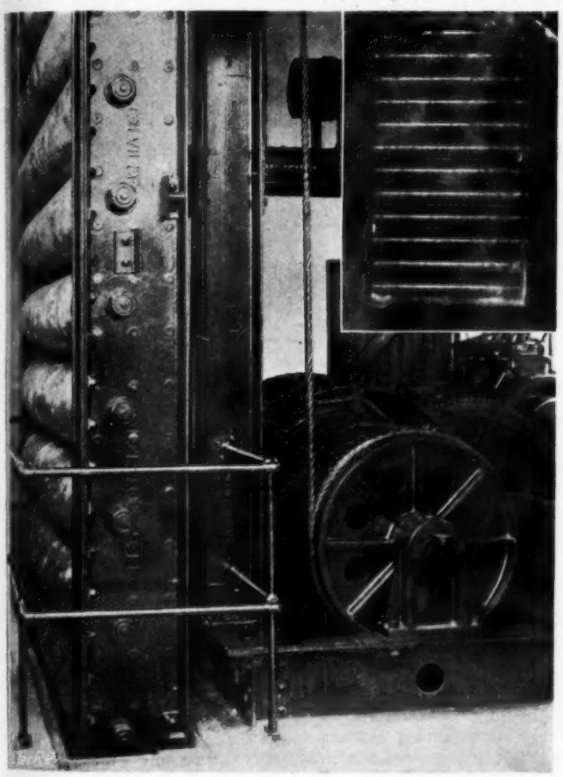
Construction at Tummel Bridge

The second development is in a comparatively early stage of construction. Although work has been in hand now for about 8 months, spade work (in a literal sense) for such a scheme makes little show with regard to time compared with the later construction work.

The scheme provides for the utilisation of the flow of the River Tummel from Loch Rannoch and various tributaries to River Tummel at Tummel Bridge, roughly 6¼ miles east of Loch Rannoch and three miles west of Loch Tummel, under a head of about 150 ft.

A regulating weir is to be constructed at the river exit from Loch Rannoch, at the east end of the Loch, and at Dunalastair, a point about three miles west of the power-house site, a dam is being constructed which will create a reservoir. From this dam to a forebay some 700 ft. south-west of the power house the water will be conveyed by a concrete-lined aqueduct now under construction. Pipe lines from this forebay will serve the turbines.

The power station will probably have initial and ultimate plant capacities on a par with the Rannoch station, and with



Roller gate " up " in intake tower. (Inset: Gate in sealing position)

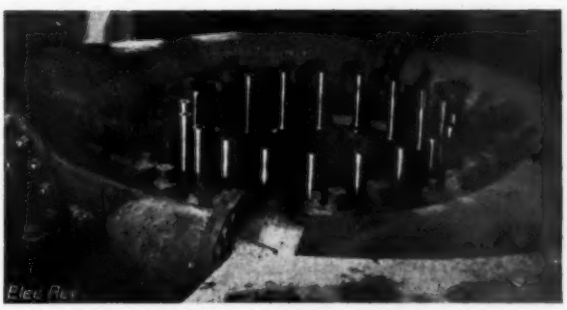
one important exception it will generally follow the same lines of construction. Owing to the lower working head, the turbines will be of the horizontal type. The tail race will convey the water back to the River Tummel below the adjacent road, where a bridge will have to be erected in due course.

Electricity for Construction

The work now being done is mostly excavation —much of it in solid rock—and an outstanding feature is the extensive use that is made of electricity. For the actual excavation a number of Ransomes and Rapier 40-kW electric shovels are employed, and there is also a 35-kW drag line of the same make. For boring and pumping operations two 150-h.p. electrically driven air compressors are employed, each having a capacity of 750 cu. ft. per minute.

The conveyance of materials, &c., on site is, of course, an important item in such a construction scheme, and a number of " Electromobile " locomotives were seen running on the light railways. Each is equipped with a 28-h.p. Horace Green motor and a 250-Ah 80-V Chloride battery.

Work is carried on night and day, and therefore considerable use is made of electricity for artificial lighting. Motoring along the Rannoch-Pitlochry road at night it was rather impressive in such " wild " country suddenly to view the Tummel lights. Along the line of the aqueduct are



Turbine casing with guide in position

pole-mounted lamps, a sign of " civilisation " in a lonely country.

As will be seen in a later article, two main 33-kV transmission lines skirt the Tummel site, and for the supply to the works one of these has been tapped to feed a temporary substation equipped with a 12,000-kW transformer—33 kV/11 kV. There is a similar tapping on the other 33-kV line at Kinloch Rannoch for a supply to the constructional works for the regulating weir, and an 11,000-V link between the two points will serve, *inter alia*, for the control of the weir from the Tummel power house. Part of this line is already in being along the line of the aqueduct, and at each pole there is a tapping to a plug-in point on the pole for supplying a portable 11,000/440-V three-phase transformer for feeding the shovels, etc., at any required point.

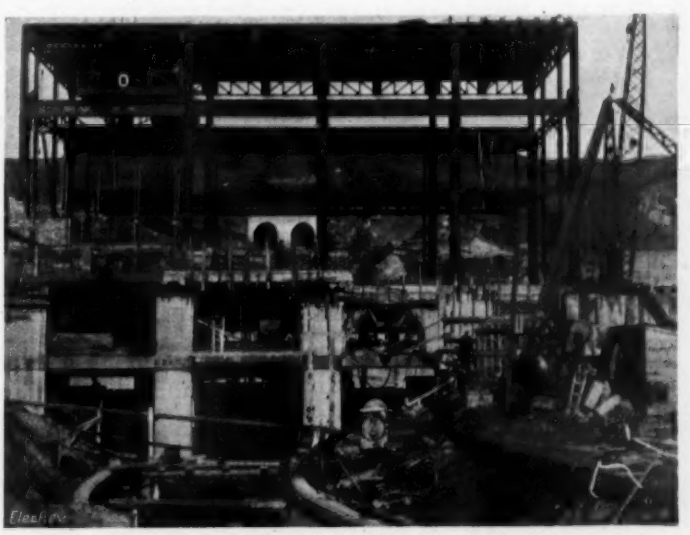
Accommodation for Employés

In such an isolated district it is necessary to provide accommodation for the workmen. A camp of wood huts has been established, and at present there are about 250 men employed. The essential camp services of lighting, heating and cooking are all provided for electrically.

The whole of the cooking equipment in the staff and general mess kitchens is sufficient to cater for 500 men, and it consists of four double-oven cookers, each with a total loading of about 36 kW, fitted with high-temperature quick-boiling plates and grillers; three 20-gallon soup boilers complete with 5-kW hotplates; two vegetable boilers of 20 and 12 gallons capacity respectively; and six 15-gallon water boilers.

In addition there are in the staff kitchen a 20- and a 45-gallon thermostatically controlled water heater. The cooking equipment was supplied by the General Electric Co., Ltd., and the water heaters by Messrs. Geo. Nobbs & Co., Ltd. The storage and laborious transport of fuel and the disposal of its residuals have been avoided by this adoption of electric cooking, and the equipment generally has proved a very satisfactory investment.

The huts are all heated by " Unity " tubular equipment, with thermostatic control, supplied by Barker, Young & Co., Ltd. Each hut is 80 ft. by 20 ft. wide and accommodates about thirty men. It is estimated that the loading which will be required with the worst weather conditions will be 20 kW. It should be understood that this space-heating problem cannot be compared with normal room heating; the wood huts do not afford the same protection as more permanent structures, and, of course, the climate of the Highlands has to be contended with.



Power house under construction. Front: Tail race. Rear: Pipe lines

Heating and Cooking. By Arch. J. Howard, A.M.I.E.E.

The problem of the boiling plate

THE possibilities of heating and cooking by electricity were visualised by some of the pioneers of the electrical industry at a very early date, but until electricity was sold for heating purposes at 1d. per kWh or thereabouts and the nickel-chromium alloy was invented, progress was very slow. We still have a frying-pan and a griller (made by Crompton's, I believe) about forty years old. The elements are embedded in a vitreous cement on the bottom of the utensils. They were very costly and gave a lot of trouble, but were quite efficient in operation.

My earliest effort in the cooking line was with a kettle, the heating element of which was a piece of platinoid resistance coil taken from a field regulator. This was inserted in a tin kettle; it was electrically connected, and supported clear of the kettle bottom, by two copper wires inserted through two vulcanised fibre bushes fixed in two holes punched in the top of the kettle, the spiral being directly immersed.

Current was supplied from a 15-A 33-V Brush-Vienna arc-lamp transformer, and the kettle was very satisfactory in every way until someone carelessly switched it on before putting water in, when, of course, the coil gave out.

I tried the same principle of immersing the heating elements direct in the water in a 40-gall. square galvanised tank during the National Kitchen "stunt," and it proved very satisfactory in every way, and the leakage through the water to earth at 210 V, with neutral point earthed, was negligible. This was no doubt largely due to the purity of the water.

A Luminous Radiator

My next effort was the invention of the "Zig-Zag" carbon-filament radiator lamp, which had a straight-through waved filament with brass collar caps at each end of the lamp which were carried in spring-clip contacts fixed on the radiator frame, thus avoiding the bad contacts and short circuits which give so much trouble in the holders of the radiator lamps of the ordinary lampholder pattern. The "Zig-Zag" filaments were also much stronger. These lamps were a great improvement on the ordinary type, and functioned so well that I fitted some of them, rated at 250 W each, into an oven carcase, and they cooked very well indeed—mainly, of course, by radiant heat.

Many of our consumers still prefer the cheerful glow of a lamp radiator to any of the modern types, and I could place a lot of "Zig-Zag" lamps if I could get any lamp manufacturer to make them. They are also excellent non-inductive resistances, and I saw a number of them in use for this purpose at Bodmin Moor radio station some years ago

Electric Cooking

My next experience in electric cooking was with the early "Tricity" cooker with plated but unlagged oven, so ably demonstrated by Mr. F. S. Grorgan, now of the Arora Co.

These cookers did quite good work, but unless special copper kettles and saucepans of "Tricity" make were used on the hotplates they were hopelessly slow, and, notwithstanding explicit instructions to the contrary, consumers would persist in using these special vessels on their coal fires, the result being that they collected about an eighth of an inch of soot on the bottoms which made an excellent heat insulator; when they were again used on the "Tricity" hotplates (of course without cleaning off the soot) they took about an hour to boil, which did not assist in popularising electric cooking.

The present-day cooker as made by the best firms is, as regards the oven and grill, a very satisfactory and efficient job and leaves little room for further improvement, except in minor details. The enclosed type of boiling plate, although slow and inefficient for a first boil, is fairly satisfactory for simmering, etc., but for quick boiling none of the ordinary open or enclosed boiling plates compares with a gas ring in respect of cost and speed of operation, even if special flat-bottomed vessels are used. In my opinion, no boiling plate or kettle bottom remains dead flat for any length of time, and it therefore soon becomes hopelessly slow and inefficient.

"Still the Boiling Plate"

I have come most definitely to the following conclusions with regard to the essentials of a quick boiling plate:—

(1) It must be suitable for quickly and efficiently heating liquids in *any* ordinary household cooking vessel.
(2) It must be as quick as the average gas ring.
(3) It must be quite unaffected by milk, etc., boiling over on it.
(4) It must be easily regulated, with the low heat adjusted to keep a vessel just simmering.
(5) It must be as small in area as possible so that quite a small vessel can be boiled quickly and efficiently.
(6) There must be no possibility of the cook receiving an electric shock whilst using it.
(7) The maintenance cost must be low.

The only boiling plate I have seen that even approximately meets all the above requirements is the "Superspeed" transformer-operated type, and, unfortunately, this cannot be used on a d.c. supply.

As you are aware, I have taken part in the discussion in your Correspondence columns which you have labelled "Still the Boiling Plate," and would like to comment on it.

Mr. F. L. Best, in his letter published in your issue of November 13th, states that the electric cooker must satisfy the consumer on the following points to be favourably regarded by the public: (*a*) "*Very fine control of the heat supply.*" This *can* be done, and is, in my opinion, desirable, but not essential; in any case, the cost would be prohibitive. (*b*) "*Very rapid raising of saucepan temperature.*" The transformer-operated boiling plate meets this requirement.

Mr. A. J. Howard, the author of this article, is Borough Electrical Engineer of Taunton

Low-voltage Elements

He also states "I believe that the ultimate domestic cooker will have exposed heating elements at non-shock voltage. Each cooker will contain a transformer for reducing the voltage."

Does he realise what the weight (and cost) of a transformer for, say, a 7-kW loading cooker would be if so designed? Also, does he realise that, even supposing a voltage as high as 50 is selected (which is much too high for an exposed element boiling plate), a 2-kW boiling plate would take 40 A; and also, what, say, four sets of multiple-way switches and cooker connections to carry 40 A each would add to the cost of each cooker?

In my opinion, one transformer-operated boiling plate, with the switching on the high-voltage side, fitted to each cooker of the ordinary type meets all reasonable requirements. Anyhow, as the present ovens and grillers are extremely satisfactory, and the elements give practically no trouble, why go to the extra expense? The cost and weight of cookers is already high enough.

I think it extremely unlikely that an electric cooker will *ever* be produced commercially that is superior to, or even equal to, a gas cooker in *every* respect, but I submit that, taking *all* factors into consideration, the electric cooker is already well in front.

Electricity Superior to Gas for Cooking

Mr. J. Martin Blair, in his letter published in your issue of November 13th, states: "It is a recognised fact that, so far as efficiency is concerned, there is no difference between a gas oven and an electric oven." This is most certainly not correct, and, if he will consult any first-class cook experienced in using both, I am sure he will agree that the electric oven is much superior, particularly for cooking meat. He also says: "Between the gas hotplate and the electric hotplate, however, there is no comparison." However, if he will try a transformer-operated plate, the control switch of which operates on suitable tappings on the transformer, I think he will modify his opinion.

Mr. Charles E. Baxter, in his letter published in your issue of November 20th, states: "Properly tackled by modern research methods, however, the boiling plate is capable of considerable improvement in the direction of speed." Well, it has already been so tackled and *solved* so far as boiling plates for operation on a.c. are concerned.

"Nothing to be Ashamed Of"

There is no necessity for electrical engineers to stress the imperfections (largely imaginary) of electric cookers and the virtues of gas cookers, as the gas interests can be depended on to do their best in this respect.

However, the undoubted fact that the gas engineers are getting frightened of electric cooking is clear proof that the latter is making rapid headway. If one compares the number of years during which gas and electric cookers, respectively, have been in process of development, it must be agreed that electric cooker manufacturers have nothing to be ashamed of.

The National Canvass—and Beyond. By W. E. Swale

A survey of the position and some practical suggestions

THE suggestion recently put forward by the ELECTRICAL REVIEW opens out the possibilities of a campaign for the overhaul of existing sales methods, and should, for this reason, be backed up to the hilt by every supply undertaking in the country.

An excellent paper by Mr. J. Eccles ("Some Commercial and Economic Aspects of the Operations of the Central Electricity Board"), read before the E.P.E.A., concludes with these significant words:—

> "In the meantime, the most important problem facing the Board and the industry, because their interests are really one when we take the broad view, is the necessity for attracting new consumers and devising new methods of utilising the electricity we have made such plans to generate and transmit."

The organisation of the grid system is virtually completed. It is hinted in some quarters that a complementary sales system may ultimately have to be administered by an official body, if the consumption of electricity does not show the requisite rate of increase. It is surely not too much to suggest that municipal and company undertakings combined can evolve a sales policy for the country which, by its results, will avert the creation of yet another brobdingnagian "board."

The Essentials Outlined

Before discussing the REVIEW'S specific proposal it is well to outline the whole problem. To begin with, the "mystery" bogy must be killed, both without and *within* the industry. The idea that electricity is difficult to sell, because the conditions of supply are capable of almost infinite permutations, is all moonshine.

Our great rivals dispense a commodity which as regards legal, financial, generating and servicing conditions must be very nearly as complex as our own, but have these difficulties deterred them from building up a superlative sales organisation? By virtue of its universal application, the relative uniformity which it will shortly achieve, and the splendid advertising value inherent in its ministerial sponsorship, electricity ought surely to be one of the easiest commodities to sell.

Can we not, therefore, begin by "getting together" on some of the generally accepted principles of salescraft. A sales manager plans under the following heads—they are set down in inverse order of disputability:—

Study of market conditions.
Maintenance of satisfactory "user relations."
Statistical research.
Study of competitive and allied activities.
Advertising and propaganda.
Determination of selling prices, and conditions of sale.

It is obvious that the details of a policy must vary widely according to the size and financial resources of each undertaking. I maintain, however, that it is possible to agree on certain fundamental rules, and, having reached agreement, to devise a means of applying them nationally with the most stimulating results. A few of these suggested fundamentals will be stated briefly.

Studying Market Conditions

This is the basis of all selling. It entails understanding your commodity, appreciating its applications, knowing the potential users. As regards the first two points it is suggested that all salesmen dealing with industrial and commercial applications, and knotty problems such as domestic water heating, should be trained electrical engineers, preferably with experience in the works and sales sides of electrical manufacturing firms.

[*Elliott & Fry*

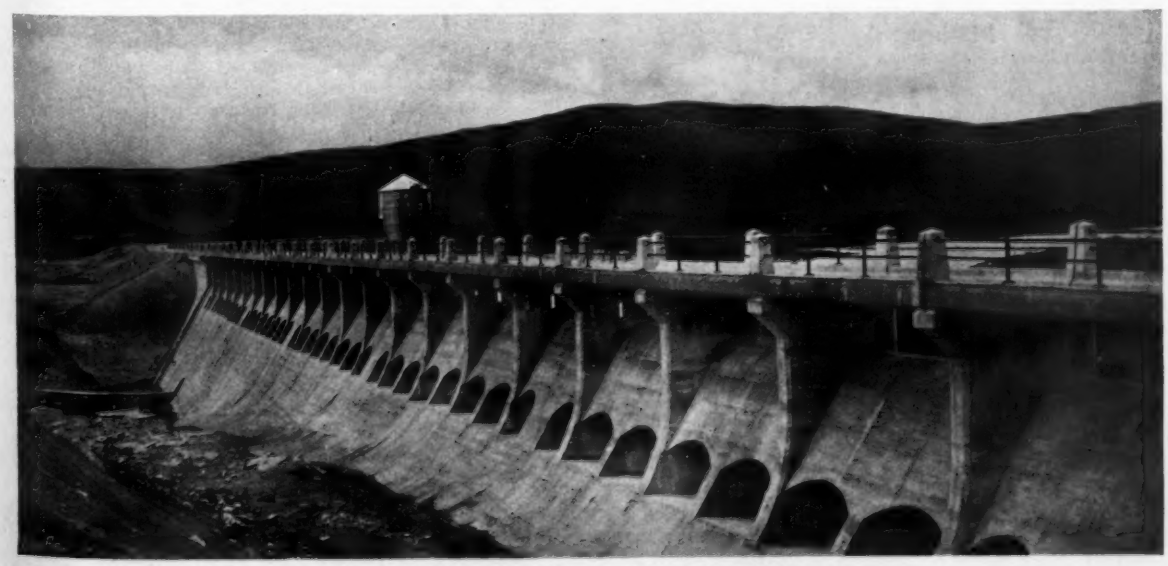
Mr. W. E. Swale, A.M.Inst.C.E., A.M.I.E.E., has had considerable experience upon the commercial side of electricity supply, and is therefore fully qualified to deal with the matters which form the subject of this article.

Satisfactory development is only possible on the basis of giving the user economic value. To demonstrate such value is the task of specialists. The objection is immediately raised that such a plan means employing many more engineers. Precisely! Most undertakings would benefit by employing at least twice as many sales engineers as they have now.

The third point—knowing the potential users—is, in effect, covered by the suggestion made in the ELECTRICAL REVIEW'S recent leader "Canvass the Country." How many undertakings know, within ten per cent. even, the amount of load still to be obtained at this very moment? How many have attempted even an approximate estimate of the trend of sales development in their areas in the next ten years?

Every sales organisation should, of course, have a classified list of consumers, from which valuable data can be extracted regarding the number of domestic, commercial, and industrial users on the mains, but then the questions arise: How many offices and works are not yet using electricity to the best advantage? How many old and inefficient prime-movers are still working in our area of supply? These questions can, in due course, be answered by an enthusiastic sales staff that sets itself the task of canvassing by letter, by telephone, or preferably by personal calls, every office and works in its area.

The 6-in. ordnance survey map, photographed up to a scale of about 12 in. to the mile, should be covered, systematically, street by street, and the names of the owners written alongside every works or shop site. Suitable record cards should then be made out for every actual or potential user, giving notes regarding existing lighting, power, and heating apparatus.



The Grampian Scheme (*see pp.* 835-7): **Main dam at Loch Ericht**

The initial canvass should be undertaken by the power sales engineers who, generally speaking, have the widest experience. Problems other than power drives are then referred to the lighting, heating, or cooking specialists for further individual treatment. The quickest returns will clearly be shown in old-established manufacturing areas where obsolete plant still abounds. It is amazing to find the number of old engines, inadequate lighting installations, and wasteful cooking plants which still exist in our industrial centres.

Once the prospective user's interest has been gained by a simple report setting out clearly the economies to be effected by electrical methods, the job can usually be handed over to electrical manufacturing firms who will not be slow to follow up the introductions effected by the supply undertaking's representatives.

"User Relations"

This is a matter to which American undertakings pay a considerable amount of attention, and relative reports of the National Electric Light Association (N.E.L.A.) deserve close study. From the seductive voice of the telephone operator (*vide* Sir Arthur Duckham) through the well-phrased and neatly typed letter right down to the personal appearance of the undertaking's representatives, there are innumerable points of contact with the user, any one of which may make or mar his opinion of our concern.

A high level of personal service is most effectively maintained by ensuring a reasonable standard of remuneration for the staff. One point in this connection is, in my opinion, so important that it warrants separate mention. I refer to the advisability of sending engineers to make a personal call on the user in the initial stages of a complaint or dispute. Much effective sales talk can be introduced after a complaint has been satisfactorily dealt with.

Statistical Research

The importance of this is so obvious that it need hardly be stressed. Apart from the usual records, which are essential to the logical development of the generating and distribution systems of an undertaking, two aspects of research warrant the constant attention of the sales manager.

The first is the collection of such records of the performance and operating costs of existing installations as will enable reasonably accurate estimates to be made of prospective installations. An enormous amount of data has already been published, for example, in the strikingly complete sectional reports issued by the N.E.L.A., but a prospective user is more likely to be favourably impressed by data collected in his own town than by figures published in foreign journals.

Next in importance to local data is national data, and I suggest that the British Electrical Development Association will find great scope in the collection and dissemination of accurate operating data. The second set of records are such as pertain to group load factors, diversity factors, etc.—the figures on which our tariffs should be based.

One has an uneasy feeling that many "special" tariffs in force nowadays are due to the importunities of the sellers of electrical apparatus rather than to theoretical merits. "*Festina lente*" is a motto as applicable to-day as when it was first enunciated; and it cannot be emphasised too often that steady increases built up on sound tariffs are preferable to spectacular leaps in load which may have unforeseen repercussions on other classes of business.

Watching Competition

It is the sales manager's task to watch the activities of competitors in his area of supply, and constant vigilance is needed. Even the slightest loss of ground should be considered a blow to the prestige of the sales staff.

As regards the study of allied activities, a constant interchange of information between neighbouring undertakings is to be encouraged. Periodic regional discussions among sales managers might be useful. The biggest scope in this direction, however, lies with our excellent organisation, the E.D.A., and I would make yet another plea for whole-hearted support by every undertaking in the country. One has only to study the activities of N.E.L.A. to see what useful work could be done in this country if adequate funds were available.

Advertising Propaganda

It is a platitude to say that advertising pays, and that all undertakings should spend more money on it. So much has been spoken and written on this subject that I will content myself with making one point—let us realise that advertising layout is an art. The best results cannot be obtained by the amateurish efforts of electrical salesmen, but rather by expert publicity agents whose business it is to get the last ounce of "pull" from the money allocated. Whether it be newspaper advertising, posters, envelope enclosures to our domestic users, or service bulletins to our power users, let us seek and pay adequately for professional advice.

Other propaganda, such as permanent showrooms, lectures, demonstration workshops, etc., have been dealt with very fully in the technical Press. Their scope is largely a function of the size of the undertaking.

One more suggestion appears worthy of thought. Can we not devise a "national mark," which will act as a key "motif" to all publicity matter brought out by authorised undertakings, so that the public will come to recognise the significance and interdependence of "national electricity"?

Selling Prices and Conditions

Here we touch on the thorniest points of all. It is too much to hope for standardisation of tariffs throughout the country; we can, however, work for the universal adoption of two-part tariffs in which running charges are standardised and fixed charges are varied to suit local conditions of distribution.

We can, also, surely achieve some measure of uniformity in conditions of sale, so that application forms, hire-purchase agreements, large-power agreements, etc., are standardised, and divested of much of the redundant phraseology which so irks the plain citizen. If the manufacturers of highly complicated machinery can devise standard conditions for the sale of their products, it is surely possible to do the same with a commodity which admits of only a small number of variations.

Measures of this kind would do a great deal to remove the prevalent impression that electricity supply is unduly complicated. Much good work has been done recently by progressive undertakings to encourage the less affluent domestic user by hire-purchase systems, assisted wiring schemes, prepayment meters, etc. Is it not possible, now, to analyse some actual large-scale results, to set forth candidly their merits and their defects, and thus enunciate a few basic principles deserving general adoption?

It is easy to write about a Utopian state of electrical salescraft, but less easy to bring the printed word to life. *The lead given by the* ELECTRICAL REVIEW *suggests, however, that now may be the time when our dreams may be vitalised into action.*

Which are the forces that influence our industry? The directors of the public companies, the committees of the municipal undertakings, the I.M.E.A., the E.D.A., and last, but by no means least, the electrical Press of the country.

Innumerable ideas are being put forward for the promotion of electrical sales. Some few of these, as I have endeavoured to indicate, may be worthy of universal application. Cannot the REVIEW, for example, submit these and others to an influential body of experts, draw up a schedule of the "fourteen points" of electrical salescraft, and then press insistently for their general adoption? Only by concerted action such as this can the industry hope to achieve the financial results needed to secure the success of the Electricity Commissioners' schemes.

Some Definite Proposals

As a concrete suggestion I offer this omnibus resolution for immediate consideration:—

The electricity supply undertakings of this country hereby resolve:—

(1) To engage more trained sales engineers and to let them specialise in power drives, industrial electric heating, illumination, commercial cooking and baking, and domestic water heating.
(2) To set their sales staffs to work immediately on a comprehensive canvass, trade by trade, of all works and business premises in their respective areas of supply.
(3) To depute their sales engineers to investigate personally all complaints or disputes.
(4) To introduce new tariffs cautiously, and to heed the opinions of their financial controllers, whose duty it is to temper the enthusiasm of sales staffs.
(5) To subscribe annually to E.D.A. at least to the full extent of the standard contribution, *viz.*, 0.1 per cent. of the undertaking's annual revenue.
(6) To engage a publicity agent, and thus ensure the maximum of effectiveness from all advertising matter.
(7) To advertise a competition for a national symbol embodying the idea of "electricity—the universal tool of mankind," such symbol to form a feature of electrical publicity matter throughout the country.
(8) To co-operate in drafting "standard conditions of sale."
(9) To co-operate in crystallising opinion regarding the value of generally applicable "sales methods."

Finally:—

(10) To uphold consistently the root principle of salescraft, *viz.*, "Sell on merit, not on price."

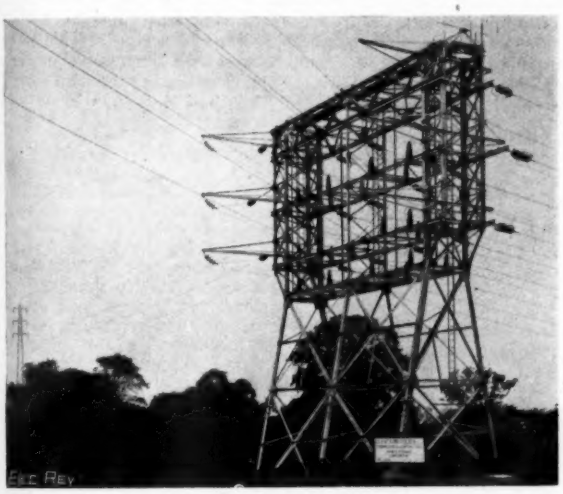
Such are a few personal ideas on the subject of stimulating electricity sales. Whether they meet with approval or not, the need for action of some kind remains.

An Eighteen-conductor Line

Carrying a multi-circuit system across a river

THREE 33,000-V double-circuit lines forming part of the Shropshire, Worcestershire and Staffordshire Electric Power Company's transmission system approach the main generating station at Stourport on the east bank of the River Severn. They meet on the brow of a hill approximately 2,000 ft. away, which slopes rapidly to a marsh adjoining the west bank. It was originally proposed to link up these three lines with the power station by means of eighteen single-core cables laid on the river bed, but it was finally decided to carry three double-circuit lines on one line of towers.

The line commences with junction terminal tower No. 4 placed on the hill referred to above, and this direct termination of the three double-circuit lines on one tower eliminates the necessity for two 90-deg. angle towers and one terminal tower. The remainder of the line consists of two intermediate towers (Nos. 2 and 3) and one terminal tower (No. 1) which is situated in the power station yard. The span from tower

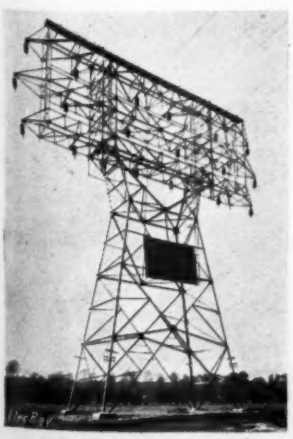


Junction terminal structure; Stourport-Wribbenhall line on left

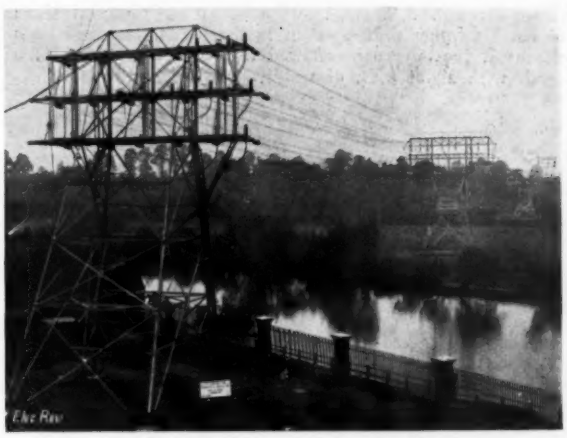
No. 4 to No. 3 is 765 ft., and from the latter to No. 2 there is a span of similar length, which brings tower No. 2 to the west bank of the river, so that the river span is only 400 ft., where a large clearance is required.

Laying Out the Line

The first layout of the line was made using the conductor at its maximum tension. The clearance over the river, being fixed to allow for the passage of vessels, also determined the heights of the two intermediate towers and the terminal tower (No. 1) in the power station yard, but with these heights excessive clearance was obtained over the marsh. It was found that by increasing the sag a few inches in the short span the tension per conductor could be lowered from 4,500 lb. to 3,640 lb., and ample clearance could still be obtained on the two other spans where the sag due to this lower tension was consequently increased by several feet; it was necessary to increase the height of both the intermediate towers and the terminal tower by an amount equal to the few inches of extra sag given in the short span. This procedure gave a higher factor of safety for the conductor and, by decreasing the terminal loads on both terminal towers by 20 per cent., also allowed a considerable saving in the steelwork and foundations required.



An intermediate tower



The line seen from the Stourport station

The towers were designed to satisfy the Electricity Commissioners' Regulations, but, in view of the importance of the line, three broken conductors were allowed for in addition; this insurance was achieved at little extra cost. The two terminal towers would obviously be relieved of loads in case of a broken conductor; on account of the low working tension in the conductors, the effect of broken conductors on the intermediate towers means little more than the stiffening of a few minor members, and more efficient details.

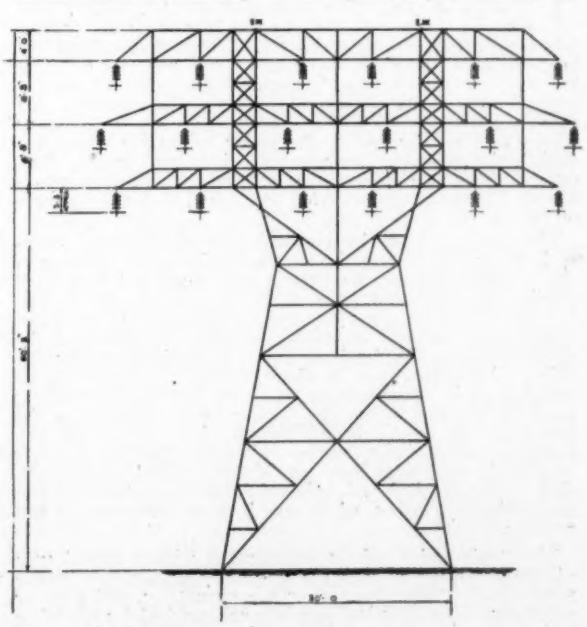
Inspection of Individual Circuits

In order to make possible the repair or inspection of any circuit without closing down any of the other circuits, enclosed ladders which pass up to the top of the towers have been provided. The tops of the towers are provided with gangways with special locked trap doors to each circuit, and heavy wire guarding is so placed as to prevent anyone passing from one circuit to another except by the trap door, the keys of which are kept in the power station, and are issued only when the line is dead.

Structurally, three of the towers—the terminal tower and the two intermediate towers—differ from those of an ordinary transmission-line tower, inasmuch as the upper portions form a portal frame, and all the transverse loadings are carried by this portal down to the lower portion, which is very similar to an ordinary grid tower. The towers are designed to give clearances for 66-kV working, although the line is at present working at 33 kV.

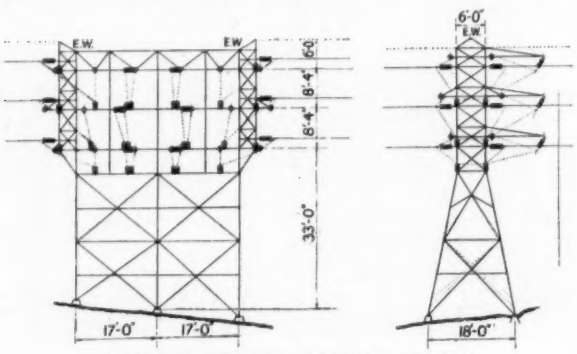
The Tower Foundations

As the marshes are subject to flooding, the foundations for the intermediate towers were designed accordingly; the value of the earth against uplift was taken at 40 lb. per cu. ft., instead of the usual 100 lb., and the angle of repose of the earth 10 deg. instead of the usual 30 deg. The proof of the reasonableness of this step was soon provided; the marshes in



Elevation of an intermediate tower

winter are almost impassable, so the work was started in the early summer, but, as soon as the foundations had been excavated, the Severn overflowed its banks and covered the marsh with about 3 ft. of water.



General arrangement of junction terminal

Test pits sunk on the marsh showed a coarse sand at about five feet below the surface, and, as this was fed from the river, it would have been an almost impossible task to keep the water level much below that of the river. The bottom of the foundations for the intermediate towers had, therefore, to be not more than 4 ft. 6 in. below the surface, and with this small depth, making allowances for the semi-buoyancy of the earth, the size necessary to cover for uplift was 30 ft. × 10 ft. for each pair of legs. A reinforced concrete slab 12 in. thick, with cross beams carrying the load to the stubs, was used. The foundations for the terminal towers, being in better ground and not being subject to flooding, are of mass concrete.

The insulators are of standard suspension type, with the exception of pedestal insulators carrying the jumpers through the terminal tower on the hill. These were designed especially for this tower; all insulators were manufactured by Steatite and Porcelain Products, Ltd.

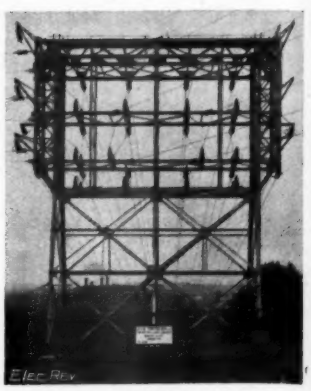
The eighteen conductors are S.C.A. (0.1 sq. in. copper equivalent) composed of two layers of 26/.0893 aluminium on 7/.07 steel. Two galvanised steel earth wires, 7/10, were also carried on the tops of the towers. The conductors were supplied by Aluminium (II), Ltd.

The J. L. Eve Construction Co., Ltd., was responsible for the design and erection of the scheme, the towers being fabricated by Gibbons Bros., Ltd., of Dudley.

The contract was carried out to the instructions of the Shropshire, Worcestershire and Staffordshire Company.

The lines radiating from the junction terminal tower (No. 4) are:—

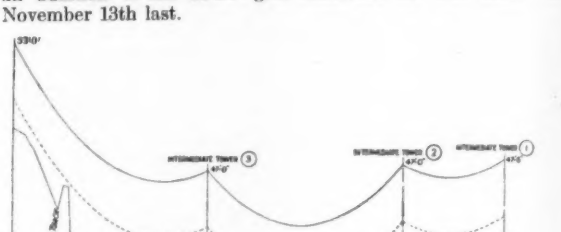
(1) A double-circuit 33-kV line to Dudley, twenty miles away, where it links up with the extensive 33-kV underground network connected to the Smethwick power station and Halesowen control centre. From an outdoor switching point, on the Stourport-Dudley line at Arley, a double-circuit line (33 and 11 kV) goes to Bridgnorth, whence a double-circuit 33-kV line is taken for interconnecting with the system of the West Midlands J.E.A.



Junction terminal structure

(2) A double-circuit line (33 and 11 kV) to Ludlow, twenty-two miles away. The 11-kV line is tapped at several points for local distribution. Step-down transformers are installed at Stockton-on-Teme and Ludlow to feed into the 11-kV network. From Ludlow a 17-mile single-circuit 33-kV line runs to Church Stretton, where the pressure is transformed to 11 kV.

(3) A future double-circuit 66-kV line to Hereford. This will provide direct interconnection between the company's power stations at Stourport and Upper Boat, Treforest, and will form an addition to the 66-kV grid described in our issue of November 13th last.



Route of the line from Stourport to terminal station

Wireless at Sea

Navigation and communication aids on modern liners

THE four new liners of the Peninsular and Oriental Steam Navigation Co., *Strathnaver*, *Strathaird*, *Corfu*, and *Carthage*, are each to carry the latest type of wireless telegraph apparatus, comprising 2-kilowatt transmitters for long, medium, and short wavelengths, and receivers covering the whole commercial wave range, with additional units for strengthening weak signals and reducing interference. To assist the navigators, direction finders with the fixed frame aerials at the after end of the upper bridge have been installed, the indicating instruments being fitted in the chart cabins. They carry all other safety wireless apparatus, including an emergency set working from an independent source of power, and lifeboat sets.

The equipment has been provided by the Marconi International Marine Communication Co., Ltd., and in addition to the wireless gear the *Strathnaver* and *Strathaird* have been fitted with the latest type of depth-sounding device (the "Echometer," see pages 429 and 431, September 18th issue) which indicates instantaneously and without the use of the ship's dynamo, the depth of water immediately under the ship. This instrument is silent in operation and can be switched on by the officer on watch and left running as long as it is required without causing any disturbance to the passengers or crew. In addition to these advantages the system of transmission employed is such that the signal is sent in the form of a beam straight from the bottom of the ship to the sea bed and reflected back again, being picked up by the hull fitting, which acts both as a transmitter and receiver.

The *Corfu* and *Carthage* are supplied with a special type of band repeater, consisting of a cabinet containing a double turntable for gramophone records, an amplifier, and a motor generator. Two deck loud-speakers are supplied for use when and where they are required, and two other loud-speakers in polished wooden cabinets serve for internal use in the ship. All the loud-speakers are fitted with flexible cable and sockets and have local volume control units to enable them to be switched on or off and the volume to be regulated to suit local requirements.

The accompanying illustration shows the *Strathnaver's* wireless cabin; the transmitter is on the right of the operator, the receiver in front of him, and the emergency transmitter on the left of the receiver.

Making Rural Electrification Pay

Opinions and suggestions

THE paper on the "Design of a Distribution System for a Rural Area" which Messrs. E. W. Dickinson and H. W. Grimmitt have read at headquarters and several provincial centres of the INSTITUTION OF ELECTRICAL ENGINEERS (ELECTRICAL REVIEW, November 20th, pp. 775-6), attracted such large attendances and aroused so much discussion that the London meeting had to be adjourned and was resumed on Thursday last week.

MR. J. M. KENNEDY said the paper was a very clever, scientific, and yet practical investigation into the problem. It demonstrated that the crux of the whole question was to make better use of the capital invested in distribution, by selling over 50 kWh per £ invested. It was impossible, however, to increase sales adequately without suitable tariffs and publicity methods.

There was some 41,000 square miles in this country not yet tackled; if approached on the lines suggested in the paper there seemed no reason why the work should not be profitable. The capital expenditure involved would be about £33,000,000, and, in addition, there would be another £60,000,000 for installations and fittings; this would give work to 140,000 men for five years. The consumers were waiting, the unemployed were waiting, and factories were not fully employed. This load would require a million tons of coal per annum, would bring into use some 800,000 kW of further plant, and at the same time would reduce the importation of paraffin into this country to the extent of about £8,000,000 per annum.

Some Technical Factors

MR. W. FENNELL said that great caution should be exercised with regard to the independent earthing of poles because in many parts of the country it was impossible to get a good earth. Wide pole spacings obviated the placing of poles in the centre of fields and saved considerable wayleave rentals. The £2 per service mentioned in the paper seemed to him optimistically low.

He had found that 50 or even 100 per cent. overload was quite easy without the temperature of a transformer approaching within many degrees of the B.E.S.A. Specification; regulation was to-day the limiting factor in small sizes and not the loading. The authors surely had made a profound mistake in suggesting that a workable tariff could be devised on the basis of a discount for quantity.

MR. F. M. LONG, whilst agreeing with the general conclusions, was disappointed that the authors did not say more definitely how they were going to get their revenue.

MR. E. T. NORRIS pointed out how voltage drop influenced the cost of transmission and distribution lines. Automatic voltage regulation had been applied to the large sizes of transformers, and manufacturers had been intensively developing similar gear for very small sizes. This would be very much cheaper than the crude method of putting extra copper into a line.

MR. J. H. C. BROOKING advocated the use of "Pernax" bird guards and insulator covers.

MR. J. R. PERKS expressed the hope that the idea of asking for a guarantee of 20 per cent. on the capital expenditure involved would be abandoned; the return now should be based entirely on the average price received. It was desirable to have some figure that would relate rateable value to revenue per consumer.

The authors' suggestion that a revenue of £25 per annum was the saturation mark for farms was unduly pessimistic, because in several cases in East Anglia the figure was £60 with an average price of 2½d. per kWh. The cost of wayleaves was serious, and assistance in keeping that cost down would be welcome. Although rent, rates and taxes frequently amounted to 6 per cent. of the gross revenue, the authors had allowed only 4 per cent.

CAPT. F. RISCH said that present methods of selling and charging for electricity would not do for the peasantry.

The Bedford Experiment

MR. R. W. L. PHILLIPS (Bedford) pointed out that the statistics upon which the authors had drawn represented a sort of average for the whole of rural England, and care must be taken in applying them to any particular area, having regard to the fact that habits varied in different parts of the country. The tendency for the revenue per £ of capital to diminish was due to the rapid rate at which rural distribution was taking place in advance of the actual demand, but there was no cause for alarm.

In one part of his area there were thirty-eight consumers, five of whom had a rateable value of over £20 per annum, and the remainder an average net rateable value of £9. The consumption in the case of the latter averaged 1,245 kWh per annum, and the average income from this small village was £7 3s. 7d., the average net rateable value throughout the whole of the village being £12 4s. An assisted wiring scheme was not yet in operation, and as to hiring out apparatus it had frequently happened in the rural parts of his area that after getting all the forms ready for the consumer to sign he decided to pay cash.

A monthly load curve of six villages revealed interesting features. The load started in April, 1930, at about 200 kW and rose steadily to 360 kW in September. It then fell suddenly through October and November to about 250 kW, with a slight rise in December, followed by a fall until March of this year. Then the load began to rise again, and reached a small peak in June, increasing to 455 kW in August. Then, as in the previous year, it started to fall again, all of which was exactly the reverse of what happened to a town load. The reason, he imagined, was that when the weather got colder the cottagers wanted to be cosier, and they lighted their coal fires and did their cooking that way also instead of electrically.

Two years ago, in the Bedford area, there were drastic reductions in price, which, in the ordinary way, were expected to decrease the revenue by about £10,000 a year. The result of the first completed year, however, was an increase of £7,368, while the gross profit rose by £1,300. That was largely due to a two-part tariff. In the Bedfordshire area facilities were being given everywhere irrespective of the immediate revenue. The demand was, however, increasing at a very much faster rate than had been expected, and the deficit on the first year was smaller than had been anticipated.

MAJOR T. RICH considered that the paper had placed rural electrification in its proper perspective. The wayleave situation needed simplification.

General Recommendations

MR. H. NIMMO expressed the view that the Commissioners' regulations did not offer any impediment, and, except for certain proposals by one enthusiastic organisation, definite suggestions for improving the regulations were rare. Indeed, lines were frequently being put up with factors of safety in excess of those required by the Commissioners.

His chief criticism of the paper was that it lacked a model tariff. Having regard to the important discussions, surely it should be possible for the Institution, after sifting the views that were being expressed, to make some general recommendations, which would be of immense value to the 665 electricity supply undertakings in this country and be the means of saving thousands of pounds of unnecessary expense.

MR. A. T. DOVER, speaking on behalf of Dr. A. Ekstrom, said that the essential requirement was economic voltage regulation, the model scheme being a trial and error method of obtaining the most economic size conductor. To put matters on a rigorous mathematical basis, Dr. Ekstrom had succeeded in obtaining expressions for all five cost quantities in a form which was not too unwieldy for engineers to handle.

MR. C. F. MOUNSDON emphasised the importance of tariffs; the actual basis of a two-part tariff did not appear yet to have been settled. The Commissioners' suggestion did not appear to have met with universal approval.

MR. R. B. MATTHEWS said the authors did not seem to appreciate the importance of the farm load. Some amendment of the Electricity Commissioners' Regulations (E.L.C. 53) was required. One entirely new application would very shortly be seen in Essex, namely, large plant for drying and disintegrating hay. These plants would take about 150 h.p. and require 600 acres of land to produce the necessary crop. The hay travelled through a long tunnel during the drying process and was then passed on to the disintegrator.

MR. J. I. BERNARD doubted the wisdom of assuming average conditions; the allowance for publicity would be insufficient.

MR. A. F. HARMER expressed the view that the domestic consumer was the most important class and that he would provide the greatest turnover. The so-called poorer classes were always the best consumers.

MRS. E. M. TAYLOR asked if anything was being done to assist the consumer to take her apparatus with her when moving from one area to another.

Authors' Figures Questioned

MR. D. J. BOLTON pointed out that according to the authors' suggested tariff there would be a difference of 62 per cent. in favour of the larger consumer. If the small householder used all he could in his house he should not be penalised as compared with a person living next door who, by reason of his larger house, was able to use more electricity. Had the authors considered the most economical section of conductor determined by Ohm's law as compared with the voltage-drop method? The rate for depreciation should not be less than 3½ per cent., and the financial details were optimistic.

MR. J. P. S. PILLANS asked whether it was intended to charge on a kW or a kVA basis.

MR. H. BENTHAM said that the agriculturist had not the money to spend on electrification, and he felt that the authors had very much over-rated the possible revenue.

MR. F. W. PURSE, chairman, pointed out that the authors had assumed the same bulk supply price whether the load was 477 or 9,746 kW, and he could not imagine that to be the case. He knew definitely of cases in which certainly for seven years and probably longer the undertakers, who had rural areas, were committed to pay prices ranging from £4 7s. 6d. per kW and 0.22d. up to £6 5s. per kW and 0.22d. Although he had heard of prices of the order mentioned by the authors, in those cases the supply authorities also had to bear the capital charges on their existing generating stations, and those must be taken into account. Therefore the authors had under-estimated the costs of bulk supply, distribution, and management.

The authors replied briefly, explaining that the paper expressed their own views, not those of the Electricity Commissioners. All their data were generally available.

Still Advancing

The Electricity Commissioners' Report indicates the effect of the domestic load in increasing output

LAST week we announced the publication of the eleventh Annual Report of the Electricity Commissioners covering the period from April 1st, 1930, to March 31st, 1931 (H.M. Stationery Office, 3s. net). (Footnotes give information as late as July 31st, 1931.) We then commented on the achievement represented by an increase in kWh generated of more than 5 per cent., in spite of the effect of trade depression on the power load, this advance being due largely to the development of the domestic load.

Undertakings in North-East England and Central Scotland lost 138 million kWh, but in the rest of Great Britain the gross increase was 683 million kWh, 53 per cent. of which was due to the South-East England regional area. There was, moreover, no slowing down in development, and several important power stations and transmission schemes were initiated.

Power Stations

Previous returns of kWh generated and fuel consumed have related to twelve-month periods ending March 31st, but the period for this section has been changed to the calendar year, which is the period adopted by the C.E.B.

For the year ended December 31st, 1930, kWh generated by authorised undertakings amounted to some 10,917 million, of which 250 public authority stations generated 6,501 million, and 245 company stations generated 4,416 million kWh. In addition, twenty-eight railway undertakings produced 826 million kWh, twenty tramway stations 408 million, and certain (sixteen) non-statutory undertakings 182 million, making the grand total of 12,333 million kWh for 559 stations, 138 per cent. in excess of the figures for 1920-21. The output during the calendar year was 3.1 per cent. above that for 1929-30, but coal and coke burned was decreased by 1.4 per cent., and oil fuel by 555 tons. The increase in the kWh generated per ton of coal over 1920-21 is 76 per cent.

The more important new stations which came into operation in 1930 included the Rannoch hydro-electric station (described elsewhere in this issue), and Kirkstall (described in our issue of March 27th, 1931). Of the 559 stations dealt with, 239 generated less than one million kWh each, and 374 stations less than ten million kWh each, while 185 stations with individual outputs exceeding ten million kWh accounted for 95.4 per cent. of the total.

Appendices give excerpts from the reports of the Joint Electricity Authorities. The most striking of these relates to the West Midlands Authority.

Centralised control from Wolverhampton and full utilisation of Walsall station, where fuel prices are low, have resulted in a reduction in fuel cost to 0.15d. per kWh from 0.17d. per kWh, the figure for the previous year, in spite of a rise in the price of coal of about 6d. per ton.

The total cost was 0.25d. per kWh generated (0.265d. in 1929) and 0.486d. per kWh sold (0.495d. in 1929). Ironbridge station is expected to be ready for load by the time that the C.E.B. has completed the local grid sub-station.

The Board's Temporary Supplies

The Report reviews the progress of the C.E.B. in so far as it affects the Electricity Commissioners. A summary of the salient particulars of the nine schemes prepared is given. The Board continued to make temporary arrangements for bulk supplies to undertakings pending the completion of the grid system, the total now being 24. Uneconomical expenditure on generating plant in local stations has thus been obviated and supplies have been made available for new areas.

The total number of bulk supplies taken or arranged for between authorised undertakers amounted to 534 at March 31st last, the number having increased by 47 in the twelve months. Approval was given to 28 further arrangements for bulk supplies or mutual assistance.

Consumers and Rural Areas

The returns of kWh sold also relate to the calendar year 1930. The increase for statutory authorities (excluding bulk supplies) was 433 million (over 5 per cent.), bringing the total to 9,030 million kWh; 5,576 million was sold by public authorities, and 3,454 by companies. The average consumption per head of a population of 44.7 millions was 202 kWh. Since the issue of the report of the Committee on Uniformity of Tariffs there has been a noticeable tendency on the part of undertakings introducing a domestic two-part tariff to adopt the size of house system. The Commissioners are generally satisfied that the floor-area method has advantages in urban areas.

Regarding charges, two Orders were made (Maldon and Chiswick) reducing the maximum to 8d. and 5d. per kWh respectively. Reference is also made to the report of the Committee on Assisted Wiring, &c., which disclosed a large scope for the provision of facilities by existing undertakings, apart from the question of the adequacy of the facilities already offered.

The fullest possible use must be made of overhead lines in rural areas to enable the maximum amount of service at the lowest cost to consumers. Returns from 200 undertakers of expenditure incurred on low-voltage mains in rural areas showed that the average cost per mile of underground cable was over 100 per cent. greater than that of overhead lines. If restrictions were placed upon the use of the latter, it would often make it economically impossible to extend supplies outside the populous centres. The Commissioners dealt with 1,304 applications for consent to the erection of overhead lines, 47 per cent. in excess of those dealt with in the previous year, and 1,285 consents were given. The number of compulsory wayleaves amounted to 191 (89 to the C.E.B.).

New Generating Plant and Transmission Lines

Sanctions were given for 829,249 kW of plant for new stations or for extensions to old stations, as compared with 292,838 kW in the preceding year and upwards of 500,000 per annum during the past ten years. Of the new plant, public authorities accounted for 466,215 kW, companies 335,812 kW, traction 40,000 kW, and non-statutory undertakings 50,050 kW.

Included in these figures is the extension of the County of London Co.'s Barking power station by two 75,000-kW sets—the largest yet sanctioned for any British station. The first section of the extension (by 318,000 kW) of Townmead Road power station of Fulham Borough Council, comprising two 60,000-kW and two 6,000-kW sets, was sanctioned (ELECTRICAL REVIEW, December 26th, 1930, and January 2nd, 1931). Another notable consent related to the three 50,000-kW sets at the Dunston station of the Newcastle-upon-Tyne Company.

The largest number of consents yet recorded in any year were given for the construction of main transmission lines, *viz.*, 115, of which the Central Electricity Board had applied for 80. These covered 1,031 miles of 132-kV lines, 11 miles of 66-kV lines, and 206 miles of 33-kV lines.

Novel Points in Acts and Orders

In regard to Special Orders, 45 further applications were received and 54 Orders were made. A feature of some of the applications (17 of which related to the establishment of new distribution undertakings) was the large extent of the proposed areas of supply.

The North Lincolnshire and Howdenshire and the Westmorland and District Orders make provision as to the relation between prices charged for electricity and divisible profits. The Manchester Corporation (General Powers) Act, 1930, included a provision for the supply of steam as far as one mile from any electrical power station (except a selected station).

Proportionate Expenditure on Mains Increasing

Sanctions were given in 869 cases to loans amounting to £24,166,783 (including £8,100,000 for the C.E.B.), an increase of £2,377,843 on the previous year. Over 58 per cent. of the total was for mains, compared with 40 per cent. of the aggregate amount sanctioned during the preceding ten years. Activity at Leeds last year is reflected in its application for £450,000 for mains and services, while Liverpool required £303,000. Loans of £887,000 for consumers' appliances were sanctioned. Oldham heads the list with £90,000, followed by Leeds with £60,000.

Consents were given to alterations in the declared systems and/or voltage of supply by 48 undertakings; these were chiefly from d.c. to a.c. at 400/230 V.

Consents were given in 26 cases to subscriptions to the following associations: E.D.A., B.E.S.A. (now the British Standards Institution), I.M.E.A., E.R.A., E.A.W., and National Register of Electrical Institution Contractors.

The administrative expenses of the Commission amounted to £45,500 (as against the estimate of £58,892), equal to 1.3d. per 1,000 kWh sold.

Standardisation of frequency expenses (which are paid for in the same way but exclusive of bulk supplies) involved a payment of about 4s. per £100 of revenue of the undertakings.

Power house and tail race at Rannoch (*See pp.* 835-37.)

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Bushing Insulators—Design and Characteristics

WRITTEN in the Electrical Engineering Department of the East London College, the paper which Mr. W. J. John read at the INSTITUTION OF ELECTRICAL ENGINEERS on December 3rd treats of the electrical characteristics, testing, and design of outdoor types of bushing insulators for transformers, oil-immersed circuit breakers, and roof cable terminations.

The provision of a "weak link" in the overhead line (by omitting one or more of the insulator units from the normal string) near the transformer, would ease the latter's insulation requirements and also limit the line surges which could reach it. The bushing should in all cases be weaker than the insulation of the transformer winding, so that, as far as may be practicable, surges are released by the flashing-over of the bushing. The duration of the over-voltage stress on the transformer insulation is then limited to the time required to cause the bushing to flash over. Regarded in this way the flash-over characteristics of the bushing should be made as low as possible; the lower it is made the greater will be the factor of safety of the transformer winding.

BUSHING AND LINE-INSULATOR FLASH-OVERS.

To stipulate that the bushings must have dry flash-over characteristics equal to, or in excess of, those of the line insulators necessitates either increasing the strength of the transformer insulation (and this may be a costly process) or the deliberate acceptance of a reduced factor of safety on the transformer winding insulation.

The argument commonly put forward in favour of equality of flash-over is that a bushing flash-over is rather more serious than a line insulator flash-over and should be avoided. If this attitude be adopted then the bushing flash-over must be made much greater (in the limit twice as great) because of the reflection of incoming voltage waves at the transformer terminals. Equality cannot prevent bushing flash-over preceding line insulator flash-over. In the opinion of the author no sufficiently useful purpose is served by demanding excessive bushing flash-over characteristics for 66 kV and above.

For voltages of 33 kV and below, however, bushings can be given line insulator flash-over characteristics, since this will not unduly increase their size or the cost of transformer insulation.

Up to 44 kV no distinction is made between neutral earthed and insulated. The advantages of this from a standardisation point of view are obvious and it is felt that the correct procedure is to increase transformer insulation rather than to decrease bushing characteristics when the neutral is earthed.

VARIOUS TYPES OF BUSHINGS.

All-porcelain air-core bushings are used exclusively up to 22 kV; at 33 kV they compete with the condenser and "filled" types.

Compound-filled bushings are used for 33 and 44 kV. Even so-called "solid" compounds are quite fluid at a temperature of 90 deg. C., which is usual in transformer working. They have higher flash-over and puncture values than the air-core type, but temperature may result in mechanical pressures of disturbing magnitude; for instance, when load is switched on to a transformer when its tank is covered with snow.

Oil-filled bushings are suitable for 33 kV and above. Flash-over is usually somewhat higher and puncture voltage a little lower than for the compound type. Oil is more costly, and the expansion chamber and gauge glass add to the expense, but oil filling is much easier than the insertion of the compound.

THE CONDENSER PATTERN.

Condenser bushings are also used for 33 kV and upwards. Compared with the oil-filled type, they are smaller and lighter for the same electrical characteristics and much easier to make oil- and weather-tight. When current transformers are incorporated the smaller diameter makes them cheaper and more accurate.

Their disadvantages are that they are more expensive and complicated, needing specialist manufacture and skilled testing. The paper of which they are made may deteriorate in time.

In the opinion of the author, condenser bushings can be obtained which will give no more trouble than any other type, but if bought from firms who are inexperienced or careless in their manufacture, then trouble is inevitable.

All-porcelain multi-tubular bushings have the great merit of simplicity, which makes for reliability in service. They consist essentially of a number of porcelain tubes arranged in concentric formation.

These advantages are maintained and the disadvantages of bulk and cost are to a considerable extent reduced in the last type, which is made on the condenser principle. The inner and outer surfaces of each tube are coated with a conducting layer of either graphite or metal sprayed on to the surface of the porcelain.

The tubes are assembled one over the other with the inner and outer conducting layers on two adjacent tubes in electrical contact. The space between the tubes is filled with compound.

CURRENT TRANSFORMERS AND CAPACITANCE COUPLING.

Most large transformers include a current transformer as part of the bushing. The primary is the through conductor of the bushing and the secondary is arranged round it. A recent development uses an internal current transformer with a wound primary consisting of multiple windings. These windings may be connected in various ways by means of links usually located at the top of the bushing, so as to give a high degree of current-transformer accuracy over a wide range of primary current.

Another recent development has been the introduction into oil-filled bushings of an internal metal sleeve from which connection is made to external apparatus. The sleeve constitutes a potential tapping or capacitance coupling. It acquires a voltage which is a constant fraction of the line voltage, and can be used instead of employing a potential transformer.

The capacitance coupling is very useful at the greater pressures for giving an accurate measure of the high-tension voltages, for metering, for synchronising purposes, for carrier-current communication and for relay operation. When used for relay operation considerable saving in energy consumption is effected as compared with alternative methods, and the absence of potential transformers raises the standard of insulation of the system. The coupling voltage is usually passed through a step-down transformer to the switchboard.

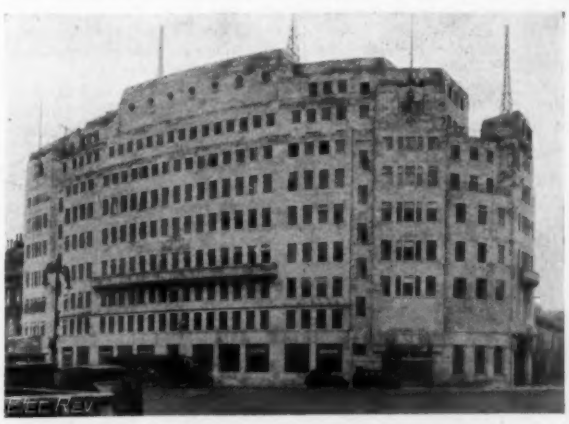
Turbine Inspection and Overhaul

OPINIONS differ considerably as to how often steam turbines should be opened out for inspection. Some large undertakings adopt the very sound practice of taking each set out of commission for overhaul after every 7,000 hours' operation and Mr. F. T. Callis, in the paper which he read on November 24th before the London Technical Group of the ELECTRICAL POWER ENGINEERS' ASSOCIATION, recommends opening up machines once a year.

The company with which he is connected inspects about 400,000 kW of plant every year. The conditions under which plant may have to operate for grid purposes may be far more trying than those previously obtaining. More frequent starting and longer standing periods may result in increased erosion, and corrosion of the blading, and trouble with joints unless extra care is taken to ensure proper drainage of steam pipes and receivers and that the turbine stop valves are tight when the sets are standing.

One other general point to which attention cannot be too strongly advocated is the advisability of obtaining and maintaining a balance on the sets as perfect as possible. A slight out-of-balance imposes on many parts a hammering force applied many millions of times, and no matter how liberal the design of those parts may be for the duty they have to perform, the persistent application of that force will produce serious wear and necessitate renewals.

There is often an unfortunate tendency for overhaul to develop into perfunctory and superficial examination of the blading without even lifting the spindles out, and such details as governors, oil pumps, and valves are taken for granted as being in a satisfactory condition. Every effort should be made to find out why wear has taken place, as the removal of the cause is better than periodical renewal of the part. One frequently comes across some condition which apparently offers a complete solution of the trouble and there is a very strong tendency to accept this, but it is often advisable, though not easy, to put that finding on one side and look for other evidence, for in the majority of cases the first solution is wrong and the remedy adopted does not remove the fault.



The new headquarters of the B.B.C., Langham Place, W.

The writer has frequently noticed a curious effect which he is at present unable to explain. On the shrouding of some blades where corrosion had been severe the edges were rough and appeared to be eaten away, and there was a definite streamline formation from the edges of the shrouding towards the centre. The deposit causing the roughness at the edges and on the top could be removed, leaving the shrouding quite clean and showing no corrosion. The deposit was ferrous oxide, the product of corrosion on these stages, and under the action of c.f. it had travelled up the inside of the blades, but was not thrown off with the water because the blades were sufficiently magnetised to overcome the c.f.

This magnetisation of the blades is confined to the stages where corrosion occurs, and in one case the outer ends of the blades were all south poles, the wheels and blades at the h.p. and l.p. ends and the spindle itself showing no trace of magnetism. The force is often sufficient to give very definite readings on a compass needle.

SOME PRACTICAL VIEWS

Mr. G. D. Bendix, chairman, said that blade erosion could be reduced to quite a large extent by ensuring clean steam and de-aeration. The reason why annual inspection had not been resorted to in the past was that operating engineers had no other plant available for use during the period of inspection.

Mr. W. J. Oswald asked whether, in turbines having a cast-steel cylinder at the high-pressure end and a cast-iron cylinder at the other, the different rates of growth of the two metals had an effect upon the alignment of the machines. It certainly increased the difficulty of maintaining the joint of the cylinder cover.

Mr. A. W. Nunn suggested that the correct method of warming up a turbine was to make it revolve slowly the moment the auxiliary gear and circulating pump were in motion, simultaneously with the formation of a vacuum, and then to increase the speed gradually. What advantage was claimed for the use of water-sealing? He could not see why glands should be subjected to extraordinarily wide temperature variation by heating them with steam and then applying cold water to them.

Mr. W. Wilde said that in America the choking of turbine blades had become so serious that the maximum loading of which the machines were capable had been reduced as much as 50 per cent. in a few cases, and 10 or 15 per cent. in many cases.

Mr. R. Pendennis Wallis said that, from the metallurgical point of view, whilst a steel could be produced to withstand almost any single known condition, it was impossible yet to produce a steel which would withstand all operating conditions; a change of conditions would necessitate a change of blades.

Mr. L. Morton mentioned the use of different alloys at different stages of the blading, with the object of securing an even rate of wear throughout the whole.

Mr. G. M. S. Sichel pointed out that insurance companies benefited from periodical inspection because it tended to eliminate troubles which might cause major breakdowns; therefore they should reciprocate by offering lower premiums where periodical inspection was adopted.

Mr. J. C. Callender said he did not mind restarting a turbine after it had been cooling for about an hour, but when restarting after cooling for three or four hours he had noticed sometimes a slight whipping action, and the time occupied in running the turbine up to speed had been longer than that required from the cold. He had had experience of kerosene lubrication over six or seven years, about 1½ pints being injected per day, but he had never found the slightest trace of grease in the boilers.

Numerous questions were asked by other speakers, to which the author replied.

Clearing the Way for National Electrification

THIS year's Rankin Lecture, delivered at the UNIVERSITY OF LIVERPOOL by Sir Philip Dawson, deals with the conditions that govern a national supply of electricity.

Not only must there be complete co-ordination of production and transmission, says Sir Philip, but distribution areas must also be so arranged as to coincide with economic and not with parochial or geographical boundaries.

Some slight modifications of the 1926 Act may be necessary if the Central Electricity Board is to achieve success. Thus at present the Board can only deal with authorised undertakers, whilst large individual consumers, such as railway companies, can only be supplied through the intermediary of the local distribution authorities.

Distribution areas should be so laid out as to include populous areas as well as thinly populated ones, and within limits the larger the area of distribution entrusted to a single distribution authority, the more satisfactory the results are bound to be to all concerned.

The broadening of the basis of supply and improved services to consumers demand a large capital expenditure which may have to remain unremunerative for several years during which the demand is built up. If distributors were safe in their tenure, they might be willing to expend the necessary funds.

The more general use of electricity throughout the country very largely depends upon the enterprise and progressive spirit shown by distributors, more particularly in the less densely populated areas. Greater security of tenure, revision of areas of supply, simplification and acceleration in securing wayleaves and consents from the Electricity Commissioners and public authorities, curtailment of existing powers to veto overhead lines and other works, and a relaxation of many rules and regulations will have to be the rule if real success is to be achieved.

Prospective customers must be educated, tariffs should be made more uniform and distributors must be made to realise that if mass production of electricity is the proper thing, so is the mass sale of it.

Selling Heavy-oil Engines Abroad

DISCUSSING a paper on the overseas operation of heavy-oil engines, read by Mr. C. M. Mayson at the DIESEL ENGINE USERS' ASSOCIATION in London on November 27th, a strong plea for the co-ordination of export selling policy was put forward by Mr. J. L. Chaloner. The potential overseas market, he said, was large compared with the home market if for no other reason than that problems of fuel quality and prices were less difficult than in this country, where coal came first. The design of an oil engine could not be enlarged indefinitely to provide the whole range of sizes; it was not true that any system of Diesel engine construction was applicable, irrespective of the character of its service. A central selling organisation could prevent redundant sizes or types from being manufactured and would co-ordinate distribution over various territories or for specific services.

The active exploitation of foreign markets by British oil engines would have one other benefit. It would provide industry with the resources necessary to overcome its disadvantages, owing to the cheapness of coal, in the home market. The national electricity grid had hitherto not brought much business to the oil-engine industry, but active development work at home, based on the exploitation of the undoubtedly large foreign demand, could eventually make the British oil engine acceptable also to the Central Board.

Wool as an Insulator

DR. S. G. BARKER, director of the Wool Industries Research Association, lectured to the Cartwright Club, University of Leeds, on November 24th on "The Electrical and Magnetic Properties of Wool." During the course of processing, he said, static electricity proved a bugbear to the industry, resulting in loss of time, money, and imperfect functioning of machines. Dr. Barker was able to show that electrification was directly preventable by the maintenance of correct atmospheric conditions of humidity and temperature, automatically controlled. Wool ranked in insulating properties with some forms of glass, and was durable and non-inflammable. Cable companies had been quick to realise the virtues of wool-insulated wires for specific purposes. Figures were put forward showing that wool was weakly magnetic and its susceptibility to magnetism had actually been measured during the last few months. Those qualities of the fibre which in the past had been largely neglected were now proving to be of practical importance, including its use as electrical insulation.

Sounding the Depths of the Sea

THE practical application of sound reflection as a gauge of water depth to the needs of navigation are described in the paper which Commander J. A. Slee read before the Wireless Section of the INSTITUTION OF ELECTRICAL ENGINEERS on December 2nd.

The author confined himself to a statement of the present state of the art, omitting detailed description of the apparatus. The fundamental principle is to create a disturbance in the water and to time the return of the echo from the bottom of the sea.

Navigators of big ships need to measure depths of from 2 to 20 fathoms, not more than 100, whereas fishing trawlers must be able to ascertain depths of at least 350 fathoms (4,000 fathoms has been measured) as the vast majority of fish are bottom feeders.

The rate of propagation of elastic waves in sea water has an average value of 4,900 ft. per sec., which means a depth of 408 fathoms for each second that elapses between the time of emission and the time of reception of the echo. Since ordinary navigators reckon the depth of water by the fathom, the unit of time which has to be dealt with is 1/408 of a second, and a large proportion of the problems of the subject consists in the difficulty of making these measurements of very short intervals of time with sufficient accuracy and by means which are suitable to the everyday conditions under which they must be used.

The period during which transmission lasts must be very short indeed in order that at least the greater part of the energy of transmission shall have died away before the echo returns. In shoal water there is no doubt that this echo is received through the last part of the transmission wave when the more highly resonant types of transmission are put into use.

Reflection sounding is by far the most accurate method known. In fairly shoal water an error of 1 per cent. is so small that its equivalent value cannot be measured, and at such depths as 100 fathoms, where there is some prospect of measuring time in a sea-going fashion to a sufficient degree of accuracy to detect an error of 1 per cent., there is no other means of checking within this degree of precision.

Squirrel-cage Motor Control

THE modern polyphase squirrel-cage motor is a remarkably fine product. With its "practically indestructible" rotor and the absence of rubbing contacts it requires the minimum of attention and maintenance, but its use has been limited by its large starting current and absence of speed control.

How these difficulties are now overcome is explained in the paper which Mr. J. R. Walton read before the London branch of the ASSOCIATION OF MINING ELECTRICAL ENGINEERS on December 1st. The methods include the use of a Barbour inductor, a variable-speed auto-transformer that enables the voltage applied to the motor to be varied gradually by merely turning a handle in a smooth stepless manner from a predetermined minimum up to line voltage or above, if necessary.

This inductor is a simple piece of apparatus and has no sliprings, brush gear, or flexible connections. It consists essentially of a fixed stator and a movable rotor. The latter has no windings on it, but is an assembly of interleaved steel laminations and copper plates.

The stator carries two windings, primary and secondary, each situated in a pair of slots, the two pairs being at right angles to one another. The rotor is mounted within the stator in such a way that by turning the rotor through an angle of 90 deg. the voltage induced in the secondary winding is changed from the maximum in one direction to the maximum in the other direction.

Thus it is possible to start and stop a squirrel-cage motor without any switching whatever and this method is an excellent one to adopt for any really severe duty, when the expense is justified. As, however, the cost of the inductor is naturally proportional to the amount of voltage variation provided, and a variation of 30 per cent. below full volts, *i.e.*, down to 70 per cent. of full volts, is sufficient to reduce the starting torque to half that of which the motor is capable, it is more usual for economic reasons to provide suitable switchgear for switching on and off and for effecting the reversal of the motor, if required.

A Variety of Views

Retrenchment or Reconstruction

THE annual dinner of the Mersey and North Wales (Liverpool) Centre of the INSTITUTION OF ELECTRICAL ENGINEERS took place on November 25th. "The Institution" was proposed by Ald. J. C. Cross, Lord Mayor of Liverpool, who thought that the time was not far distant when a corporate member of the Institution would be of the same standing professionally as a doctor or chartered accountant. Capt. J. M. Donaldson, president, replied. Mr. F. J. Marquis proposed "The Electrical and Allied Industries," remarking that not a few statesmen and administrators believed that this country would be saved by lowering the standard of living. Recovery would not come from flagellation and self-denial, however, but from discovery and reconstruction. Lord Cozens-Hardy, responding, said that the electrical industry was the only great industry that had remained upright in the economic blizzard. When the allied industries recovered there would seem to be nothing to prevent the electrical industry becoming a giant. Mr. S. E. Britton proposed "Our Visitors," and the Rev. W. Paxton replied. Mr. A. J. Pratt proposed "The Chairman," and Mr. P. M. Hogg responded.

The Rising Tide

The annual dinner of the Scottish Centre of the INSTITUTION OF ELECTRICAL ENGINEERS was held at Glasgow on November 24th. Prof. G. W. O. Howe presided and Principal R. S. Rait, of Glasgow University, proposed the toast of "The Institution." Capt. J. M. Donaldson, President I.E.E., in reply, said that the more people used electricity the better was the trade of the country. That was accepted on the Stock Exchange as a fair indication. They in the south had always been thinking that in the last few years the tide of prosperity had been travelling north. He thought it had reached Lancashire, and he hoped that it would reach the Clyde and the Forth before very long. At the moment he felt there was an air of defeatism about some people which was very wrong. The toast of "The Chairman" was proposed by Mr. E. Seddon, city electrical engineer, Edinburgh.

Engineers and Economics

The annual dinner of the South Midland Centre of the INSTITUTION OF ELECTRICAL ENGINEERS was held at Birmingham on Friday last. Mr. N. B. Rosher, O.B.E., chairman of the Centre, presided. After dinner, Sir Andrew Duncan, Chairman of the Central Electricity Board, spoke of the need for adjusting scientific considerations to the economic position; engineers should put aside their personal predilections. Capt. J. M. Donaldson, President I.E.E., insisted that the electricity supply industry had to obey ordinary business laws. Tendering by too many firms for contracts, &c., was a waste. Invitations for tenders should not be broadcast. He had a suspicion that in some cases contracts were settled before tenders were invited, and he condemned such practice very strongly. Mr. Rosher said that the Centre had been successful in obtaining new accommodation for its meetings. The Bishop of Birmingham said that engineers had brought nations sufficiently in close contact for the world to be an economic unit; but the nations were not yet ready for such a development.

System Change-over

At a joint meeting in London of the ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS and the ASSOCIATION OF ENGINEERS-IN-CHARGE yesterday, December 3rd, Mr. H. Nielson lectured on problems connected with the change-over of power plant to a.c. Types of converting plant and attendant factors, floor space economy, voltage range, the scrapping of equipment, wiring problems, &c., were explained, and the efficiency of rectifiers, as compared with other plant, at industrial voltages was discussed. Special reference was made to the totally enclosed frame-cooled motor squirrel-cage, slip-ring, synchronous induction, and salient-pole motors and starters. Power factor correction and other pertinent problems were also dealt with.

The London Floodlighting

In a paper on the "Street Architecture of London," at the ROYAL INSTITUTE OF BRITISH ARCHITECTS on November 30th, Mr. H. Robertson said that in the display during the September International Illumination Congress perhaps the real and unconsciously felt appeal of the floodlighting lay in the power of light and shade to transform familiar parts of London into the semblance of an ideal city, one in which all that was sordid was blotted out, and only the fine things left to yield their greatest value. Most of the buildings which were floodlighted were worthy of the effort expended on them.

Muscular Electricity

Recent discoveries of research workers who are supported by the ROYAL SOCIETY, were surveyed in Sir F. Hopkin's presidential address on November 30th. At Cambridge, said Sir Frederick, Prof. Adrian had been able to observe the action of a single nerve cell in his own spinal cord by needle electrodes placed in his muscles. A striking feature was the general similarity of the behaviour of all nervous structures from whatever animal they might be taken. Prof. A. V. Hill, in London, had concentrated on the heat effects that accompanied the passage of a nervous impulse. The combined basis of nerve impulses was the release of energy by the chemical processes of the body, the building up of electrical pressure, the passage of physical impulses accompanied by minute electrical currents, and the release of a physiologically active substance.

Electricity and Health

The second of two lectures was delivered by Dr. Elizabeth Sloan Chesser to members of the ELECTRICAL ASSOCIATION FOR WOMEN on November 30th. The effects of electrical treatment and light rays on the skin, scalp, and mucous membrane were described, and their utility in the removal of skin blemishes, the promotion of hair growth, and the rectification of digestive disorders and chest troubles was indicated. Mr. C. C. Paterson, who presided, said that before long suitable British-made lamps would be available which would be certified as safe for use. The I.E.E. had appointed an influential committee to keep in touch with all medical applications of electricity and render help by bringing the electrical engineer in closer contact with the medical profession's requirements.

A New Accelerometer

One of the several papers which were submitted at the November 20th meeting of the PHYSICAL SOCIETY was by Dr. F. Aughtie, who described an instrument that has been devised for measuring the acceleration of the rear axle of a vehicle. The new method, which has been developed at the National Physical Laboratory, enables the recording to be done remotely (electrically) in order accurately to phase three records: two of acceleration and one of spring load. The auxiliary equipment includes a remote electrically recording load gauge for wheel-impact measurement.

"Back to the Land"

An address on "The Electrical Transformation of Great Britain" was given to the members of the EDINBURGH CITY BUSINESS CLUB by Mr. G. S. Francis, of the British Electrical Development Association, on November 24th. Having referred to the modern development of electric power, Mr. Francis explained the national transformation likely to be effected by the operation of the Electricity (Supply) Act, 1926. He said that it would prove especially beneficial to rural areas, a matter of increasing importance, for some means must be found of making country life sufficiently remunerative and attractive to check the townward drift. Electric power would enable many industries to return to the country, where rents and rates were low.

The Finchley Tramway Depôt

Extension and modernisation

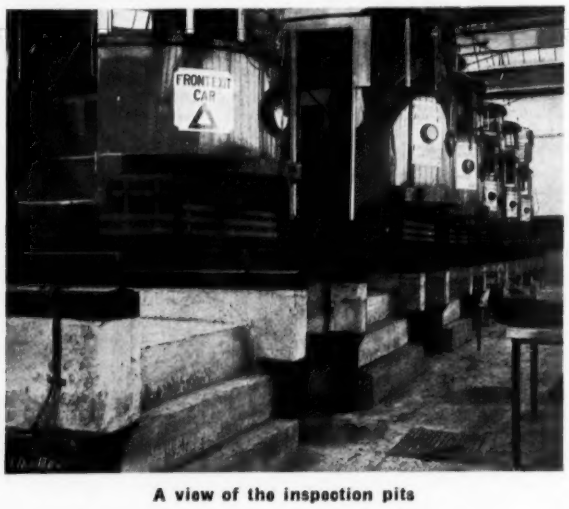
SINCE January last a hundred new saloon-type tramcars have been put into service by the Metropolitan Electric Tramways, Ltd., and the London United Tramways, Ltd. Although a corresponding number of old cars have been scrapped, the greater length of the new vehicles (40 ft. against 30 ft.) rendered additional shed accommodation necessary, and it was accordingly decided to extend two depôts where land was available.

At Hanwell the bare requirements to house the L.U.T. cars have been provided, but the "Met." extension at Finchley is of a more elaborate character. In addition to enlargement, the depôt has been modernised to permit of the introduction of a progressive system of cleaning and inspection under which nine men attend to one car in 5.5 minutes.

Cleaning and Maintenance

When a car enters the depôt it is immediately water washed by means of combined high-pressure jets and brushes, one on each side. Two 300 lb. per sq. in. "B.E.N." pumps, driven by 5-h.p. "Bull" motors, are employed.

The car is then moved forward between two lines of suspended gantries to the vacuum cleaning section, and immediately the car comes to rest four hoses (two for the lower saloon and two for the upper saloon) are taken into the car to enable the whole to be cleaned simultaneously.



A view of the inspection pits

While the cleaning work is being carried out a man in the pit inspects the whole of the undergear, the underneath of the car being floodlighted by eight reflector lamps. Only inspections and minor adjustments are carried out here, and should anything demand further attention the car is "docked" and dealt with afterwards.

In order to avoid the risk of accident a simple signal arrangement has been installed. One man on each level, *i.e.*, gantry, floor, and pit, is detailed to throw over his switch immediately the section is clear, so that the last man to finish controls the movement of the car. The all clear "Go" light will not appear until all the switches are correctly set, and the car must not be moved until the signal is received. The undergear man in the pit controls the key switch and re-sets the circuit ready for the next car directly the finished car moves away.

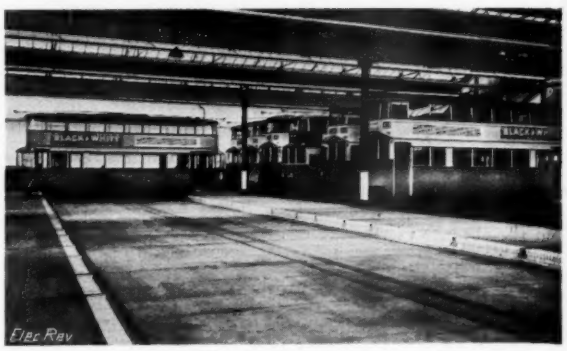
The third stage comprises a move forward by the car on to a traverser, on which it is shunted broadside into position for the night, the traverser returning immediately to position ready for the next car. This method of working calls for close co-operation between the operators of the three sections, and all of them were trained in their own particular duties prior to the institution of the scheme.

The Heywood traverser is a 17-ton, six-wheel, three-rail model, designed for use in a working pit 11½ in. deep. The drive is by means of a 20-h.p. motor through worm wheel and double helical reduction gears, this method of driving being favoured to obtain quietness in running. Two controllers, one on each side, are fitted and braking is by means of a band on the armature shaft.

The Overhauling System

A number of cars are placed in the overhaul section each day, the idea being that it is better to take the cars to the men than to keep the men moving from car to car about the depôt. With this object in view, sunk walk ways between cars and a transverse working pit with benches have been provided; all pits are well lighted and heated.

The end wall for a height of 10 ft. is finished in white glazed bricks, and immediately above are windows running the entire width of the pits. The traverser facilitates the placing and the removal of cars as required. Within easy reach are the stores and fitters' shop.



The traverser in use

Cleaning and Heating Equipment

Dirt and tickets collected from the car floors by the vacuum plant are delivered into an incinerator.

For the convenience of the staff one room has been equipped as a drying room. Coat racks with hooks for eighty men are provided, and along the bottom of each rack are hot-water pipes with subsidiary tubular electric heaters for use in summer.

Three cleaning gantries, each 140 ft. long, have been installed over the clear way between tracks. They are of angle-iron construction with open steel flooring, and staircases are provided at both ends. Three subsidiary suction pipes from the vacuum plant are carried on the floor of the gantries, hose points being available at spaced intervals for seat cleaning.

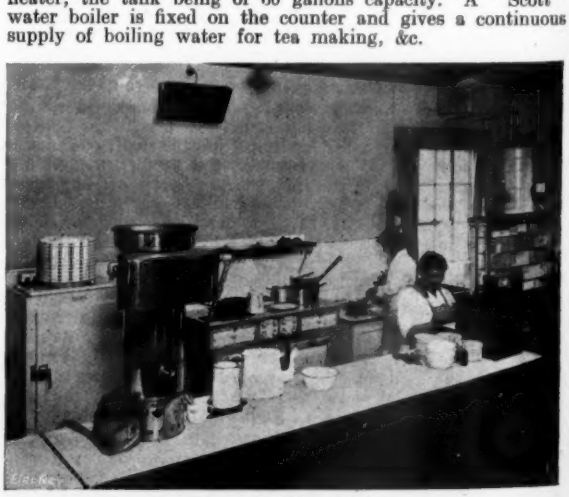
The heating plant is the hot water "Homatra" circulating type, the furnace being oil fired. Once started, it is thermostatically controlled between predetermined limits of temperature. Ignition is by electric spark and the blower and circulator are motor driven.

The cleaning plant is a Sturtevant 35-h.p. 8-stage turbo exhauster, designed for cleaning on a large scale, driven by a 3-phase, 415-V, 2,900-r.p.m. motor. The whole of the piping, with the exception of the lift from floor to gantry, is hidden from view, but is easily accessible. Plug points are provided at certain points to facilitate the removal of sweepings from the car pits, and experiments are now in hand to clean the floor in the vicinity of the pipe lines by vacuum in place of the usual yard broom.

The traffic and ticket offices have been rebuilt and redesigned. Two headway recorders register electrically the passing of cars on adjacent routes. They are surmounted by an electrically-controlled timepiece. Tubular electrical heating is installed in the traffic office and panel heating in the ticket office.

An All-electric Canteen

The canteen, which is provided for the sale of meals and light refreshments to the staff, is fitted with kitchen apparatus operated electrically. A double-oven "Hotpoint" cooker with five boiling plates, grill, and hot cupboard is installed. There is also a "Jackson" 4.6-kW fish fryer. Hot water is provided by means of a thermostatically controlled "Nobbs" heater, the tank being of 60 gallons capacity. A "Scott" water boiler is fixed on the counter and gives a continuous supply of boiling water for tea making, &c.



The all-electric canteen

The kitchen is tiled, and in addition to cooking apparatus contains a B.T.H. refrigerator. The room is heated by means of "Morganite" panels placed at regular intervals around the walls and a Ferranti luminous radiator is also provided; it is fixed to the wall and can be tilted downwards at varying angles. All the electric heaters are controlled by "Unity" thermostats.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Imported Glassware

I read with interest the letter from " British Contractor " and should be obliged if you or your contributor could furnish me with the names of British makers of glassware.

We have on several occasions tried to find such makers and on one occasion placed an order for some bowl fittings to be made to selected samples. Many weeks passed before we got delivery and the goods were not at all to sample when they arrived. The firm undertook to replace them, but the second batch also were crudely finished.

I have recently been pilloried for purchasing a large stock of a simple type shade from Czecho-Slovakia even though we placed the order in time to save extra cost through the altered rate of exchange. For years I have wanted to buy glassware from English sources, but strange to say the British makers never seem to show any eagerness to advertise their wares. I should only be too glad to give them support if they would let us know about their products and sell them at a reasonable price.

C. M. SHAW,
City Electrical Engineer.

Worcester, *November 27th*, 1931.

The letter of " British Contractor " in your issue of November 27th raises an important question.

Approximately 97½ per cent. of the illuminating glassware which we sell is made in England. The small remaining percentage is made abroad for technical reasons at our own Holophane works. Of our metal fittings, all are made in this country. We can, therefore, claim that Holophane is a British product, and that in buying it, the trade is giving employment to our own workpeople.

We agree with " British Contractor " that hitherto, too little attention has been paid to the enormous amount of foreign illuminating glassware which has been sold in this country. This has been due probably to a variety of reasons, but now that the needs of the country demand the use of British products, we feel certain that the electrical trade will be as alert as other classes of the community in demanding British-made products. It only needs the position to be explained to them for them to stipulate when inquiring for goods that they must not be foreign but British.

W. T. DEAN, *Sales Manager, Holophane, Ltd.*

London, S.W.1, *December 1st*, 1931.

The Contractor's Job

We have read with interest Mr. W. G. Graham's article in your issue of November 20th which sets out in an exceptionally clear style the sales aspect of the domestic section of the business. There are, however, some points in this article, our comments on which we submit below, which run in contradiction to our own experience :—

(1) We think the majority of contractors will be with us when we say that no firm using reasonably good materials and employing adequate supervision and labour can expect to show anything but a loss at the price of 11s. 6d. per point. When Mr. Graham speaks of profit in this instance we can only think he is referring to gross profit.

(2) On page 766 the statement is made that " small profit on many jobs means a better balance-sheet than the same gross profit made over the same period with only half the work done." We presume this should read the same percentage gross profit. Interpreting the sentence in this way we feel justified in pointing out that, however ideal this principle may be, there is an economic limit below which the margin of gross profit left is insufficient to cover the charges of administration, and unless the contractor is in a position to make a very accurate forecast of possible future contingencies, then by cutting gross profits too fine he is running a grave risk of future failure.

(3) Much help has been rendered to the contracting industry generally by the E.D.A. and we think that perhaps some reference to this by Mr. Graham would have been of assistance.

EASTERN ELECTRIC INSTALLATION CO., LTD.,

Chelmsford, *November 24th*, 1931.

After reading Mr. W. Gore Graham's statement in your issue of November 20th, " It is absolutely necessary for the canvasser to acquaint himself with the supply authority's rules, apart from the I.E.E. and Home Office regulations," it is rather surprising to read a little later in the same article, " The cheapest method of wiring a modern bungalow is undoubtedly by slip conduit "—but for the word " modern " one might have been reading history, for really the only times I have handled slip conduit fittings have been during dismantling operations.

However, opening my little red book at pages 46-47 I read " All classes of cable . . . may be enclosed in steel conduit provided that . . . the electrical resistance of the conduit in a complete installation measured between the conduit at a point near the main switch and any other point of the installation does not exceed 2 ohms."

Now apart from the note which follows rule 47 : " Plain slip sockets do not comply, etc." I think the wireman would find it very difficult to get his ohmmeter needle to stand at 2 ohms or less on a slip conduit job (although I admit he should have no difficulty using lug grip fittings). As a matter of fact I think a megger would be a much more suitable instrument to measure with !

I have, however, seen some very creditable garden borders made with the aid of slip conduit fittings !

But for the above points I found Mr. Graham's article very useful and offer him my thanks.

H. E. HUNT.

Northampton, *November 22nd*, 1931.

We were very interested in Mr. Gore Graham's article published in your issue of November 20th, but a little surprised to find that while he provides an estimating basis for hanging pear switches, he makes no provision for ceiling switches.

The convenience that a pear switch gives in the matter of two-way control from the bed, is provided in a much safer manner by a ceiling switch. However well designed a pear switch may be its operation necessitates the handling of live flexible, and while the latter may last a long time in normal service, it only needs time or a little carelessness on the part of the wireman to make it a danger point.

The ceiling switch is a far more robust and more reliable mechanical arrangement; its use confines all the live wiring to the ceiling level and when controlled by an insulated pull-cord this hazard is entirely eliminated. It is, of course, more expensive, but when the cost of the flexible necessary with the pear switch is taken into account, there is very little in it.

In small rooms, where the bed-head is within a foot or so of the door, a ceiling switch only will suffice to give the convenience of control from either the door or bed at a cost far below that of a pear switch and a wall switch. For damp situations such as the bath room and kitchen, the ceiling switch is undoubtedly the safest form of control and in certain classes of installation in Australia it is common practice to use nothing but this pattern.

KERSONS MANUFACTURING CO., LTD.

Aston, Birmingham, *November 26th*, 1931.

Canvass the Country

With regard to the formation of a National Electrical Commercial Supply Association, I have been in communication with several of my colleagues connected with local supply authorities, and so far have received a splendid response, in fact, the outcome is likely to be a meeting of the interested parties locally.

May I make a suggestion that those in different parts of the country do likewise, and report the results of such activities in your columns? This I think would create a healthy interest to all concerned in this already interesting proposal.

PROTECTION.

November 28th, 1931.

I quite agree with all that has been said in your columns with regard to the necessity of forming a Commercial Association for the electricity supply industry; such an organisation is very much overdue.

Cannot we take a leaf out of the book of that splendid body, the E.P.E.A., which has my admiration for the dogged persistency which it has manifested in attaining its present status and recognition? There will be unquestionably a tremendous amount of " spade work " in the formation of such an organisation, but I am certain that once we get a definite lead there will be no question of its ultimate strength and power.

In your issue of November 13th, you commented upon a scheme advanced by Mr. Howard Foulds advocating such an association. Could we not again call upon Mr. Howard Foulds to take the initiative; I am sure that a man so well known to the industry would be certain of satisfactory support.

PROGRESS.

November 28th, 1931.

Tunnel link over River Ericht (The Grampian Scheme, *p p.* 835-7)

Auxiliary Tubular Heating

I have read with interest several articles in the ELECTRICAL REVIEW drawing the attention of your readers to the adaptability and economy of a heating installation composed of electric tubular-heating units. I realised some time ago that under some conditions the running costs of such an installation would prohibit its use, and yet I appreciated the fact that under this system temperature could be controlled very efficiently within small limits.

I was desirous of giving our clients the benefit of this ideal control under any conditions, and so, when economic reasons have prohibited an all-electric heating system, my firm has installed in many cases a dual system of heating whereby the main heat is supplied by a central system, while the variable heat is supplied by means of electric tubular heaters controlled by thermostats.

The method employed is to limit the amount of heat supplied from the central heating surfaces to that required on a day of moderate outside temperature. The thermostats are set to this temperature with the electric heaters out of circuit. When colder outside conditions cause a drop of temperature inside the building, the thermostats bring the electric heating units into circuit to supply the extra heat required to maintain the temperature at the required level.

In Scotland, where we have cold mornings and nights with warmer periods between, we find the system ideal for practically all purposes, but more especially for hospital operating theatres, wards, etc., where a steady level of temperature is always desirable.

JOHN DRUMMOND, JUN.
(*John Drummond and Son*).

Glasgow, *November 24th*, 1931.

Still the Boiling Plate

I think Mr. Best hits the nail very hard on the head in his remark of the domestic problem of "worry-free and fatigue-free cooking," as any housewife with experience depending entirely upon electric hot plates realises what that means.

I would like to put a proposal forward for the consideration of the electric oven makers, and that is that they should build an oven and sell it without hot plates, allowing the householder to approach his local gas company for his boiling rings and griller, as everyone realises that neither a gas company nor an electricity supply company would be prepared to connect up their services to any joint cooking apparatus.

The electric oven could then be put up on any convenient stand with the gas rings beside it, which would make the whole equipment safe from both suppliers' point of view and also at a very convenient height for the cook or housewife to use.

I even go so far as to suggest that it might be well worth while for some of our progressive electric oven makers to go in for an efficient gas hot plate as Mr. Best suggests until they are able to get out a design that will make the electric hot plate take the place of the gas ring and prove its worth.

J. MARTIN BLAIR.

London, E.C.1, *November 27th*, 1931.

Electrically Designed Installations

In mansion houses, large town houses, and better-class neighbourhoods generally, it is the result rather than the cost that the householders consider. I would therefore suggest that greater efforts should be made to develop electrically designed lighting installations, particularly in those areas in which low rates per kWh are available.

By "electrically designed" I mean designed specifically to suit electricity, as distinct from the conventional systems designed for oil or gas fittings. First-class passengers on the M.V. *Britannic* breakfast, lunch, and dine in perpetual sunlight, for the portholes are screened by false, oblong frames in the ship's side, giving the effect of ordinary windows from which emanates a soft, rich, yellow glow irrespective of the weather. Here, then, is electrically designed lighting, superior to the sun in that an evenly distributed and constantly equal volume of light is produced, capable of being switched on or off as required. Such an effect could not be obtained by either oil or gas.

If the lighting is designed electrically, there is no difficulty in meeting all the various requirements. The illuminating engineer evolves two types of lighting, (a) practical and (b) decorative. With the first he produces uniform illumination and eliminates shadows, "spotty" effects, and all the other drawbacks of present-day private house lighting. With the second he gives light exactly where and how it is required, varying volume, position and colour to suit the individual uses to which the apartment may be put.

If more designers of electrical appliances (of all kinds) were to think electrically, instead of accepting the limitations imposed by obsolete methods, the effect on the development of our industry would be marked indeed.

November 28th, 1931. C. J. STUART.

The Case for Ultra-Violet Radiation

As a member of an industry which was as nearly as could be killed by too precipitate official action, will you allow me to state the recent experience of manufacturers of ultra-violet ray apparatus for the benefit of those who, very naturally, chafe over the inevitable delay in applying tariffs at the present juncture in our national affairs?

After the war we built up a thriving industry which developed rapidly until about two years ago. Then, out of the blue, came an official report, suggesting in effect that the claims made for ultra-violet radiation could not be substantiated. Needless to narrate, there was no conscious distortion of fact in the verdict presented: it was simply based on evidence collected from a limited area too hastily surveyed.

But what was the effect? A flourishing industry almost ceased to be and very many of its workers found themselves unemployed. Subsequent events are the best commentary upon that situation of two years ago.

To-day practically every hospital in the country, as well as many private homes, factories and public institutions, are equipped with ultra-violet apparatus, where a vast number of ailments of a very varied character are successful dealt with. There are lamps at almost every aerodrome to keep the airmen fit.

Banks use the ultra-violet rays to detect forgeries; cigarette manufacturers to remove from tobacco irritants which cause smoker's cough. They are employed in testing dyes, in making patent leather, in ageing wines, in making linoleum, in the treatment of oil, and in many other industrial processes. In brief, as our knowledge of ultra-violet radiation extends, so its usefulness grows throughout the whole life of the community.

Nobody to-day questions the efficacy of the ultra-violet rays; and in two years we have completely succeeded in raising up our industry again from the ruins in which it was left by an ill-considered Government report. Surely the moral for these times is—deliberate before you legislate.

F. W. READ, A.M.I.E.E.,
Director, Medical Supply Association, Ltd.

London, W.C.1, *November 28th*, 1931.

Power-station Men and Distribution

I doubt whether the matter of the employment of power-station engineers in the distribution departments of electricity supply undertakings, consequent upon the "rationalisation" of the industry, is receiving the attention it merits.

Whilst the difficulties associated with this change may, in the case of older men, be real ones, the same cannot, I think, be said of the younger engineer, though there would appear to be a doubt on the part of some engineers in authority as to the capabilities of the latter, when viewed in the light of mains work.

To-day there are a number of young engineers at present engaged on power-station work who realise the limitations imposed by the present conditions and are ready to make initial financial sacrifice in order that their training and ability may show sufficient return, both to themselves and to the industry which they serve. B. N. HOLROYD, Grad.I.E.E.

Croydon, *November 23rd*, 1931.

Electric Clocks

It is interesting to learn that impulse electric clocks can be fed by sealed batteries kept continuously charged by means of a trickle charger, and presumably if no electricity supply is available, a small petrol electric set could be installed to provide the necessary current.

It is also interesting that a firm supplying both systems states that the impulse is the better system, whilst Messrs. Everett Edgcumbe in explaining the wear on synchronous clocks give the assurance that they prefer the twelve years' experience obtained with one type of clock, rather than experiment on the public. Presumably the public will be duly gratified.

However, I respectfully ask: Are not all these methods hopelessly out of date? Cannot clocks be driven and controlled by central electric supply stations, probably by superimposing a ripple on the mains, such stations having their frequency controlled at one national point? Surely in these days of rapid development we should not be content with our past experiments, but have the courage to go on going on.

K. H.

November 27th, 1931.

Testimonials from Employers

I would like to voice a grievance on another line but bearing on the above subject.

Why is it necessary for employers when advertising to ask applicants to send copies of references? In my time, I have replied to as many as four advertisements at one time, each reply containing reference copies. I have had no reply to my applications, and quite a lot of time is wasted by having to write out further copies of references, all to no purpose. This is not so bad if you have a firm's name to address, but as the majority of advertisements are under a box number it seems unreasonable that one should be called upon to furnish these particulars to any Tom, Dick or Harry, the majority of whom you hear from no more.

I think that if an applicant for employment sets out his capabilities in a clear and concise manner, an employer should be able to determine if he is likely to meet requirements; references could then be called for. I do not see that any of the employers' time would be wasted on these lines, and I feel that a better feeling would exist between all parties concerned.

November 28th, 1931. FAIRNESS.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

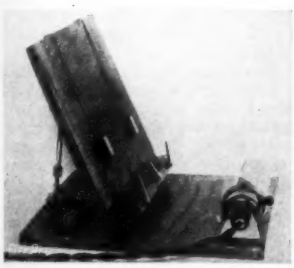
Cooker Control Unit

THE MIDLAND ELECTRIC MANUFACTURING CO., LTD., Barford Street, Birmingham, has produced a new cooker control unit under the name "Memkuka." The standard pattern consists of a 30-A d.p. main switch, a subsidiary 5-A all-insulated switch, a controlled and fuse-protected 5-A 3-pin B.E.S.A.-gauge plug and socket, complete with a lampholder and ruby lens for a pilot light. The whole is enclosed in cast-iron case finished either jet black or grey-mottled vitreous enamelled. The cable entry is at the back of the case, and there is a notable absence of fixing lugs, hinges, &c., all of which are inside the case. Special attention has also been paid to the appearance of the unit.

"Memkuka" control unit

Reading in Bed

An improved type of book-holder has been produced by MEK-ELEK ENGINEERING, LTD., 57, Victoria Street, S.W.1. It is claimed that this effectively holds a book and avoids the disadvantages of many kinds of book rest. The device has primarily been designed for use in bed, but it may be used in an armchair or at a table or even in the pulpit.



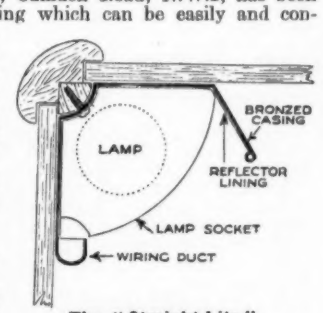
The "Mek-Elek" book-holder

It has a flat baseboard, which rests on the bedclothes either in front or at the side of the reader, and to this is hinged the back, which has a small ledge on which the book stands. In the centre of this ledge is a special fitting carrying a peg which goes between the binding and pages and prevents the bottom of the book from slipping, and other arrangements add to the convenience of the appliance. On the base is mounted a switch-holder carrying a shade, and as the light is thrown upwards and from the direction of the reader, the eyes are effectively shielded from the direct light of the lamp. This lamp also affords enough heat to warm the hands.

The standard finish is polished oak or mahogany with nickelled fittings, a lamp, three yards of flex, and a 5-amp. plug or adaptor.

Showcase-lighting Reflector

A new showcase-lighting reflector introduced by STRAIGHT-LITE REFLECTORS, LTD., 65, Camden Road, N.W.1, has been designed to provide a fitting which can be easily and conveniently fixed without disturbing any part of the interior. It consists of a right-angled metal shell with the corner shaped to fit the showcase bead and a hood to screen the light source. The wiring is carried in a duct formed at the bottom of the shell. The reflecting surface may be of polished aluminium, chromium plate, stainless steel or mirrored glass. The exterior of the fitting is finished to harmonise with, and appear as part of, the showcase. The holder has been specially designed to ensure that the lamp fits perfectly and that good contact is obtained. It permits the easy removal of the tubular lamps. For the wiring a heat-resisting flexible cable is employed which eliminates all risk of fire.



The "Straight-Lite" showcase unit

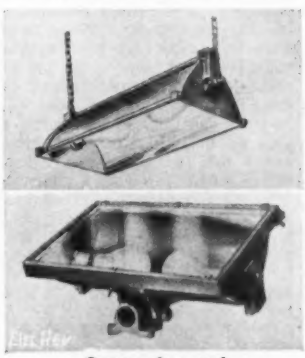
Fire-protection System

We have received from the WALTER KIDDE CO., LTD., Cambridge Works, Montague Avenue, Hanwell, W.7, the following particulars of the "Selex" fire-protection system that they have installed on the new British ship *Monarch of Bermuda*, which has recently made its trial run and has been described in our pages.

The complete installation consists of an annunciator board in the wheelhouse and thermostats in the cabins and public rooms. Should a thermostat be heated to a temperature of 165 deg. F. a small quartz bulb containing special liquid bursts and allows a contact to be made, which, in turn, rings a bell in the wheelhouse. The officer of the watch then opens the door of the annunciator cabinet and upon a ground glass appears the deck and cabin number showing where the thermostat has operated. The advantage of the system is its selectivity, in that the situation of a fire is noted exactly and promptly.

Improved Trough Reflectors

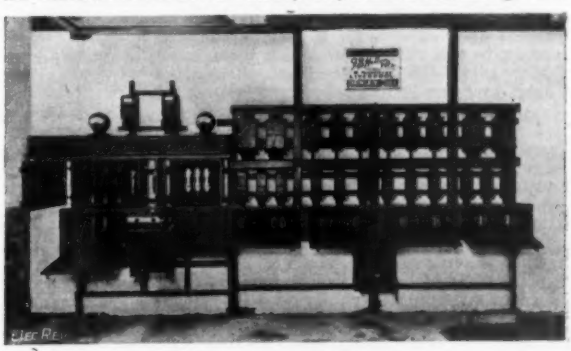
THE EDISON SWAN ELECTRIC CO., LTD., 123-5, Queen Victoria Street, E.C.4, has recently re-designed its "Mirolux" trough reflectors. For lighting from concealed sources reflectors having symmetrical distribution are often essential, and the improved reflectors meet this case. They are available with various kinds of fixing, and are of stainless steel, carried on cast-aluminium end plates, to which all-porcelain holders are attached. They can be easily wired and installed. The bracket unit is capable of adjustment over a wide angle in both horizontal and vertical planes. The bracket fixing can be fitted over a conduit box or ceiling rose, thus enabling permanent wiring to be carried out independently of the fittings. Glazing frames and anti-glare shields are supplied for special applications. A weatherproof unit for exterior floodlighting to give either white or coloured illumination is also available to meet customers' requirements.



Suspension and "Mirolux" reflectors

"Turret" Trunking Switchboards

A development of the "Turret" cable-trunk conduit system introduced by the POWER CENTRE CO., LTD., 15, Park Lane, Liverpool, and described in our issue of May 31st, 1929, is the construction of switchboards, etc., from the trunking. An example (installed at Brown & Rawcliffe's Works, Aintree, Liverpool) is illustrated. The cover plate is secured to steel strips at intervals, these being easily removable to enable the cables to be readily pushed into place in the trough and secured, pending the replacing of the cover. Cables are not damaged in any way in installation, no draw-in boxes are required, and a very compact and orderly appearance is obtained.



A "Turret" switchboard

Petrol-engine Testing Outfit

The "Motor-Ex-Ray," made in this country by ARDO DEVICES, LTD., 35, Norton Street, Liverpool, is a collection of various apparatus required in testing a petrol engine. The five instruments used are a pressure gauge, vacuum meter, voltmeter, ammeter and a "Geisler" tube with which is combined a variable spark gap. There is also a standard condenser, against which the condition of any other electrical condenser can be tested. The pressure gauge records the engine cylinder compression, and the valves and carburettor can be tested by means of the vacuum meter, which is coupled to the inlet manifold while the engine is running. The voltmeter and the ammeter are used to test the ignition system, while the "Geisler" tube and the spark gap give an indication of the way in which the sparking plug in each cylinder is functioning.

The Textile Machinery Exhibition

IT is some credit to the organisers of this Manchester exhibition, in view of the very serious state of depression in the textile industries, that they were again able to stage a good display of textile machinery and accessories. It is true that a number of the larger manufacturers were absent from the exhibition, but from the point of view of accessories there was no reduction in the number of exhibitors. Numerous labour-saving devices were shown and the part which the electrical industry is taking in the rehabilitation of the cotton trade was fairly well illustrated.

The Drayton Regulator and Instrument Co., Ltd., drew particular attention to its "VT" temperature regulator, the "Dial-Set," and "MS" regulators in their new circular case. Among other interesting features was a newly developed heat motor valve for the automatic control of room temperature in connection with a thermostatic switch, and also a water-mixing valve for use on thermo-electric storage systems and for other water blending requirements.

Electric Furnaces

Progress in the use of electric furnaces is slow, but much greater interest is now manifested in the subject by textile engineers and others connected with the Lancashire trade. In this connection Kasenit, Ltd., showed two models which have not previously been exhibited in this country, and they were certainly new to the textile engineer. The first machine was of the single-chambered type for annealing, hardening, tempering, &c. There was also a tool-steel hardening furnace of the double-chambered type which attracted considerable attention. It is fitted with an automatic regulator which keeps the furnace at any desired constant temperature up to 1,200 deg. C., with a guaranteed tolerance of plus or minus five degrees, and thus eliminates the danger of overheating.

The framework of both of these furnaces is built up of mild-steel angles to which are fixed the switches, and the electrical connections are protected by a steel wire cage which can be moved with ease. The furnace is composed of steel plates forming the casing, which is insulated to prevent radiation. Standard firebricks are used, there being no specially moulded bricks, thus facilitating repair work. The heating elements are entirely separate and are removed from the outside of the furnace by disconnecting a terminal screw. If a single element breaks down it is not necessary to renew the whole of the elements, or to break up the brickwork. The door is counter-balanced and hangs inside the furnace casing.

Textile Control

Among textile accessories electricity has recently played an increasingly important part, and one of the most interesting, in view of the urgent need for increased production, is the warp stop motion. At this exhibition a very interesting example was shown by Grob & Co., Ltd., of Switzerland. The stop motion consists of a U-shaped conductor and an inner conductor insulated from it. A fallen heald connects the two conductors, closes a circuit, and stops the loom by means of an electro-magnet. This new device does away with the old system of droppers, which, owing to the tension employed, were not satisfactory for the finer silks. Either direct or alternating current may be used, at from 12 to 15 V.

Another example of the use of electricity in the production of a smoother working machine was demonstrated in the new patent automatic electric dye jigger shown by Sir James Farmer Norton & Co., Ltd. This is driven by a special patented electrical device which allows the speed of the draw rollers to increase or decrease according to the alteration in the diameters of the batches of the cloth on the two rollers. Thus a constant cloth speed is maintained throughout the length of the run and uniform shades throughout the length of the piece are ensured.

The tension of the cloth can be regulated to suit the requirements of the fabric being dyed. Owing to the electrical design there is no snatch or shock on reversal of the batch, a feature which is unavoidable when mechanical clutches are employed. The remarkable feature is that the power required per jigger is only ¼ h.p. The whole operation is entirely automatic and self-reversing.

Motors

The good display of Brook Motors, Ltd., included squirrel-cage, surface-cooled totally enclosed motors working partly submerged in water to demonstrate the possibility of running the motors under the worst possible conditions. Other motors were shown working in sawdust and sand, which was certainly a very effective way of bringing the matter before visitors.

There were also special motors for loom drives and for other textile purposes; a buffing motor of new design with large bearings, shaft, and bearing spread demonstrated the decreased bearing load and consequent long life obtained; also a half section of a standard 20-h.p. slip-ring motor with brush-lifting and short-circuiting gear.

A portable stroboscopic tachometer, which can be connected to any lamp socket, serves two purposes, for, in addition to speed indication, it can be slowed down for more minute examinations, a feature of particular appeal. Servis Recorders, Ltd., exhibited a new model connected to an electric motor and operated by an electro-magnet, which marks the chart, showing exactly when the motor is stationary and when running.

Accessories

Thomas and Bishop, Ltd., demonstrated the advantages of treating a belt with their "Cling-Surface" and "Erusa" by means of a motor driving a countershaft by a leather belt running vertically and from this to a generator by two belts running horizontally. When the load was transferred from the treated to the untreated belt the voltage immediately dropped considerably, the lamps glowing only faintly.

Among further accessories there was the Ashdown "Rotoscope," used for slow-motion study and accurate speed checking. It has a patent bladed shutter which is driven by a clockwork motor and has a range from 500 to 20,000 r.p.m. The slow-motion effect is obtained by variable-speed control by which the spindle being examined appears to be running slowly. When the spindle appears to be stationary, its speed can be noted without actual contact by multiplying the main gear ratio by the speed of the (variable) speed control.

Interesting unit heaters were shown by G. N. Haden and Sons, Ltd. They comprise heater batteries of copper spiral gilled tube, which can be heated from either steam or water boilers. Air is discharged through the heaters by means of aluminium-bladed propeller fans electrically driven, and the heaters are fitted with deflecting louvres on the front to direct the warm air down towards the working zone. Thermostatic control effects considerable fuel economy.

Among other exhibitors were George Kent, Ltd.; Royles, Ltd.; John Ormerod & Sons, Ltd. (leather belting); William Kenyon & Sons, Ltd. (driving ropes); Thomas Broadbent and Sons, Ltd. (electrically driven hydro-extractors); J. H. Fenner & Co., Ltd (belting); Thomas Bolton & Sons, Ltd. (copper rollers, tubes, sheets, &c.); Frys, of London; Bolton Superheater and Pipe Works, Ltd.; Victory Valves, Ltd.; the Turbine Furnace Co., Ltd.; Ronald Trist & Co., Ltd.; Small and Parkes, Ltd.; the Sturtevant Engineering Co., Ltd.; and W. & J. Richardson.

Parliamentary Notes

[From our Special Reporter]

Post Office Surplus

On November 23rd, in reply to MR. RHYS DAVIES, the Postmaster-General, SIR K. WOOD said that he was unable at present to state the final position with regard to Post Office finance for 1930-31, but he was advised the following figures were not likely to undergo any substantial alteration: Postal surplus, £9,850,000; telegraph deficit, £1,005,000; and telephone surplus, £343,000; making a total net surplus of £9,188,000.

Automatic Telephones in London

On November 23rd, in reply to questions by SIR A. BEIT, SIR K. WOOD said the conversion of the London telephone system to automatic working would, in accordance with the present programme, be completed within the next ten or twelve years. There were at present 118,460 automatic subscribers' lines in the London area, or about 31 per cent. of the total. Future progress must depend to some extent upon the rate of new development achieved, but the past average had been about 30,000 lines a year.

Sir K. Wood informed MR. CHORLTON that the total amount paid in royalties in respect of automatic telephone plant since 1923 was approximately £43,000.

The Severn Barrage

On November 25th, Dr. WORTHINGTON asked the Minister of Transport if, when considering the report of the Committtee on the Severn River Barrage, he would, before giving his assent to that scheme, cause an inquiry to be made by the Electricity Commissioners into the desirability of making the fullest possible use of the adjacent source of power in the coal measures of the Forest of Dean in order to reduce the unemployment in that area.

MR. PYBUS said he had noted the request for consideration in due course.

London Tube Extensions

Replying to questions by COLONEL GOODMAN on November 25th, the Minister of Transport (MR. PYBUS) said that the London Electric Railway Co. was extending its line northwards from Finsbury Park, and expected to open part of this extension during next year. The Metropolitan Railway Co. was constructing a new branch line from Wembley Park to Stanmore, widening the line between Wembley Park and Harrow, and carrying out other improvements which were expected to be completed during next year. He understood from the companies that about 2,000 men were directly employed on these works. Vacancies notified to the Employment Exchanges were, generally speaking, filled by men resident in the district, but he had no information as to the extent to which this preference applied to the whole of the labour employed on these schemes.

British Electrical Imports

Statistics for 1929 and 1930 compared

THE following statistics of the imports of electrical goods and appliances and machinery into the United Kingdom in 1930, showing the principal countries of origin, have been extracted from the recently issued Annual Statement of Trade (Part III). Figures for 1929 are added for purposes of comparison and notes of increases or decreases are also given.

The total value of electrical goods and apparatus imported into the United Kingdom continued its upward course in 1930 and amounted to £7,026,676, as compared with £6,510,079 in 1929 and £4,711,000 in the previous year.

The total value of electrical machinery imported into Great Britain in 1930 was £1,816,962, as compared with £1,901,218 in 1929 and £1,731,430 in the previous year.

Goods and Apparatus

	Thousands of pounds. 1929.	1930.	Inc. or dec.
Wires and cables, rubber insulated (not telegraph or telephone)—			
Total	247	229	– 18
From Germany	149	146	– 3
„ Holland	43	28	– 15
„ Belgium	24	18	– 6
Ditto, insulation other than rubber (not telegraph or telephone)—			
Total	668	704	+ 36
From Germany	233	254	+ 21
„ Belgium	180	238	+ 58
„ United States	91	66	– 25
Telegraph and telephone wires and cables (not submarine)—			
Total	47	32	– 15
From Germany	18	22	+ 4
„ Belgium	11	6	– 5
Telegraph and telephone instruments and apparatus. Wireless (except valves)—			
Total	1,428	1,026	– 402
From Germany	387	453	+ 66
„ Holland	778	284	– 494
„ United States	110	126	+ 16
Ditto, other—			
Total	200	170	– 30
From Germany	57	27	– 30
„ Belgium	75	68	– 7
„ United States	50	58	+ 8
Carbons, lighting—			
Total (mainly from Germany) ...	26	32	+ 6
Ditto, furnace—			
Total (mainly from United States) ...	62	69	+ 7
Ditto, other—			
Total	64	93	+ 29
From Belgium	22	1	– 21
„ France	30	72	+ 42
Cloth and tape, insulating—			
Total (mainly from United States) ...	82	76	– 6
Electric glow lamps, 20 volts and over, gasfilled—			
Total	179	259	+ 80
From Austria	63	150	+ 87
„ Netherlands	92	97	+ 5
Ditto, other—			
Total	211	211	—
From Netherlands	43	41	– 2
„ Italy	27	9	– 18
„ Austria	94	131	+ 37
Ditto, under 20 volts for flash lamps—			
Total	99	90	– 9
From Germany	30	41	+ 11
„ Japan	50	41	– 9
Batteries, flash lamp—			
Total	167	131	– 36
From Germany	121	101	– 20
Ditto, other—			
Total	652	565	– 87
From Denmark	107	96	– 11
„ Germany	364	344	– 20
„ Holland	103	77	– 26
Accumulators, portable—			
Total	34	60	+ 26
From Germany	19	19	—
Ditto, stationary—			
Total	9	18	+ 9
Lighting accessories and fittings, including switches—			
Total	502	490	– 12
From Germany	277	273	– 4
„ France	54	41	– 13
„ United States	63	78	+ 15
Bell apparatus (not telegraph or telephone)—			
Total (mainly from Germany)	32	30	– 2
Instruments, commercial, including ammeters, voltmeters, etc.—			
Total	75	91	+ 16
From France	27	25	– 2
„ United States	26	37	+ 11
House service meters, complete—			
Total	121	143	+ 22
From Germany	75	81	+ 6
„ Switzerland	41	56	+ 15
Ditto, parts—			
Total	59	64	+ 5
From Switzerland	19	18	– 1
„ United States	23	26	+ 3
Scientific electrical instruments—			
Total (mainly from United States)	254	1,175	+ 921
Electro-medical apparatus (other than X-ray)—			
Total	36	36	—
From Germany	20	23	+ 3
„ United States	11	8	– 3
Wireless valves—			
Total	231	198	– 33
From Holland	115	15	– 100
„ Austria	73	120	+ 47
X-ray and vacuum tubes—			
Total (from Holland) ...	38	28	– 10
Goods and apparatus not elsewhere specified—			
Total	950	965	+ 15
From Germany	306	384	+ 78
„ Switzerland	128	149	+ 21
„ United States	295	233	– 62

Machinery

Imports of machinery were as follows:

	Thousands of pounds. 1929.	1930.	Inc. or dec.
Generators, a.c.—			
Total	112	23	– 89
From Switzerland	87	11	– 76
Ditto, d.c.—			
Total	43	20	– 23
From Denmark	13	1	– 12
„ Switzerland	10	4	– 6
„ Germany	7	6	– 1
Motors, a.c.—			
Total	156	168	+ 12
From Sweden	55	58	+ 3
„ United States	59	66	+ 7
Ditto, d.c.—			
Total	289	223	– 66
From United States	232	173	– 59
Ditto, railway and tramway—			
Total	2	—	– 2
Converters and transformers, rotary—			
Total	23	11	– 12
From Belgium	11	—	– 11
„ Germany	2	6	+ 4
Ditto, static—			
Total	25	32	+ 7
From Sweden	9	11	+ 2
„ Holland	7	1	– 6
Control and switchgear—			
Total	24	39	+ 15
From United States	21	28	+ 7
Ignition magnetos—			
Total (mainly from United States)	7	3	– 4
Vacuum cleaners—			
Total	579	764	+ 185
From Sweden	30	90	+ 60
„ United States	170	240	+ 70
„ Canada	225	294	+ 69
Electrical machinery not elsewhere specified—			
Total	640	535	– 105
From Germany	83	97	+ 14
„ Holland	40	16	– 24
„ France	58	43	– 15
„ Switzerland	20	23	+ 3
„ United States	396	314	– 82

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

An Inquiry from Mombasa

Recent articles in the ELECTRICAL REVIEW on electrical bakery equipment have brought us an important inquiry from Mombasa, where a contractor reports a number of inquiries on hand for electric baking "machinery." We shall be pleased to put manufacturers of such equipment in touch with our correspondent.

The Second Anti-Dumping Order

The Abnormal Importations (Customs Duties) No. 2 Order was made on November 30th, and it takes effect as from to-day (Friday). The classes of goods affected include battery carbons. Glass bottles and jars are also scheduled, but those which can be described as scientific glassware, and already pay a "Key Industry" duty, are exempt from the new impost. The duty placed on the goods is 50 per cent. *ad valorem*.

Abnormal Electrical Imports

We give below the official figures relating to imports of electrical vacuum cleaners and parts, wireless apparatus and electrical carbons (other than for lighting and furnaces) for several months in 1930 and 1931 which the reader may compare with the figures showing the accelerated rate of importation during the first ten days in November this year. Particulars of these and other items covered by the first Anti-Dumping Order are set out in tabular form in White Papers (Cmd. 3970 and 3974) obtainable from H.M. Stationery Office.

COMPLETE VACUUM CLEANERS (ELECTRICAL)—NUMBER.

	(1930).		(1931).
September	11,078		7,053
October	13,362		19,055
November	9,582	(10 days)	9,304
	Jan. to Dec. (1930).		Jan. to Aug. (1931).
Monthly average	12,045		10,734

VALUE OF COMPLETE VACUUM CLEANERS AND PARTS.

October, 1931	£135,886

WIRELESS APPARATUS (INCLUDING PARTS AND ACCESSORIES, EXCEPT VALVES).

	(1930).		(1931).
September	£97,416		£129,696
October	£152,761		£236,670
November	£119,880	(10 days)	£167,749
	Jan. to Dec. (1930).		Jan. to August. (1931).
Monthly average	£85,509		£83,334

WIRELESS APPARATUS, INCLUDING RECEIVING SETS—NUMBER.

	(1930).		(1931).
September	Not separately stated		8,968
October	" " "		17,061
November	" " "	(10 days)	18,398

ELECTRIC CARBONS (OTHER THAN LIGHTING AND FURNACES.)

	(1930).		(1931).
September	£13,095		£64,052
October	£36,568		£48,516
November	£28,873	(10 days)	£20,948
	Jan. to Dec. (1930).		Jan. to August. (1931).
Monthly average	£22,453		£15,504

British-made Hellesen Batteries

In our last issue we recorded the registration of Hellesens, Ltd., under the auspices of the Danish concern of that name, and Messrs. A. H. Hunt, Ltd., the present sole selling agents for Hellesen batteries in the United Kingdom. We are now informed that Mr. A. H. Hunt (chairman of A. H. Hunt, Ltd.) is a director of the new company, while his son, Mr. C. H. Hunt, is managing director. It is the company's intention "to safeguard and increase the sales by producing a British-made Hellesen battery, and all the types previously sold, as well as a large number of others, will be available in the course of a few months."

New Radio Factory at Willesden

In our "New Companies" columns this week is announced the formation of the Zetavox Radio and Television Co., Ltd. Works have been acquired at Coles Green Road, Willesden, where the company will shortly commence the manufacture of "Zenith" radio receivers, the telephone number being Gladstone 4787. The sales of the receivers will be undertaken by a second company, the Kenneth Brooks Radio & Television Co., Ltd., which has been formed for this purpose by Messrs. Kenneth Brooks, Ltd., the present distributors of "Zenith" apparatus in this country.

British Rotary Switch Manufacture

We have already reported that the Hart Manufacturing Co. intends to manufacture its "Diamond H" rotary switches in this country. The company now informs us that it has been assembling the switches here for the past fifteen years, in a comparatively small manner, and, in addition, has purchased practically the whole range of its Bakelite covers from English manufacturers, together with certain metal stampings and turned brass parts.

"It is obviously impossible for us to set down a complete manufacturing plant for our switches immediately, but our present intentions are such that although our prime activities will be devoted to the assembly of English and American made parts on English porcelain, we shall gradually and definitely take over the complete manufacture of our switches, so that they will be, in due course, 100 per cent. British made."

The works will be situated in outer London, and the company hopes to employ, in the near future, quite a large semi-skilled staff. At present it has a nucleus staff which is being trained in every department and these people will take over "charge hand" positions immediately the works are ready for occupation.

Also to Manufacture Here

Messrs. McLeod & McLeod, distributors of manufactured raw materials for factories, of 329, High Holborn, W.C.1, state that in consequence of the anti-dumping duties they are arranging for many of the lines that they have formerly imported in the shape of semi-raw materials for supply to electrical and radio factories, to be made either by or for them in the United Kingdom. These include their "Mandek" cellulose acetate bobbins. An interesting feature of their plans is the issuance of an invitation to their own customers to state which of these products they think they could manufacture competitively for them, the idea being to give their own past customers preference of manufacture.

Lancashire Dynamo and Crypto

The very close association that has existed for some years between the Lancashire Dynamo and Motor Co., Ltd., of Trafford Park, and the Crypto Electrical Co., Ltd., of Acton Lane, Willesden, is to be carried forward into a complete amalgamation as from January 1st, 1932. They will operate under the joint title of Lancashire Dynamo & Crypto, Ltd. There will be no change in management, and the closer relationship will ensure even more efficient service. The change of name takes effect as from the date mentioned. The company employs British capital, British brains, and British craftsmanship, and adopts the phrase "There is efficiency where there is unity."

When is a Vacuum Cleaner British?

An interesting point was raised recently at Westminster County Court, in a case before Judge Turner, in which the Tellus Vacuum Cleaner, Ltd., sued Miss Edith Francis for £16 16s. on a contract to purchase a vacuum cleaner. Miss Francis alleged that the demonstrator claimed that except for one switch the cleaner was entirely British, whereas the machine was entirely Danish. Mr. M. E. Lang, sales manager of the company, said that all the parts of the machine were not Danish. The materials were obtained to a great extent in England and the machine was assembled at the Vauxhall works where the company employed 1,000 British subjects. In giving judgment for the company with costs, the Judge said people who used the term "All-British" must do so clearly from the start, and define what they meant.

Wages in the Electricity Supply Industry

At a meeting of the Joint Industrial Council for the Electricity Supply Industry held last Friday it was announced that an agreement had been reached between employers and the trade unions whereby the wages in the electricity supply industry in Greater London and two other areas are to remain unchanged. The employers had been negotiating for a cut in wages and the unions for an advance. As no agreement has yet been reached in five areas, which include Lancashire, Yorkshire and Scotland, these cases will be considered by the National Council on December 7th.

Lighting the Mansion House

With reference to the note which appeared in our last issue (page 826) concerning the new lighting at the Mansion House, London, Mr. S. Tatchell, the architect for the renovation, says that the electrical installation work was carried out by Messrs. Girdlestone & Co., while the crystal electroliers in the Saloon and elsewhere were supplied by Messrs. Osler & Faraday, Ltd. The loudspeaker brackets were designed and manufactured by Messrs. Bainbridge Reynolds, Ltd.

Philips' Lamps Developments

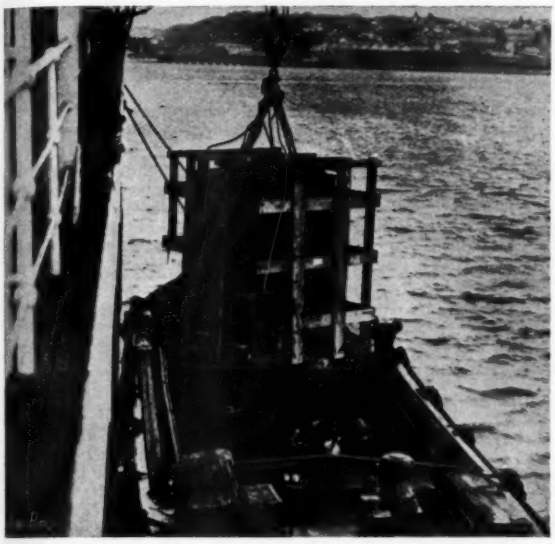
The Amsterdam correspondent of the *Financial Times* reports that the directors of Philips' Incandescent Lamp Works, Eindhoven, Holland, have issued a statement to the effect that 70 per cent. of their sales of electric lamps in England has so far been manufactured in this country, but measures have now been taken for the remainder of their British lamp sales to be manufactured here. As regards wireless, their British factories already supply the greater part of the sales, and will shortly be able to satisfy the entire demand in this country for Philips' apparatus.

The directorate also announces an agreement with the Tele-

funken Co., the wireless subsidiary of Siemens & Halske and the A.E.G. The agreement will not remain restricted to the parent concerns, but will extend to the interests of both companies over the whole world. It will at the same time put an end to the pending litigation between the two parties to the agreement.

British Transformers for South Africa

We reproduce below a picture of a "Yorkshire" transformer being transferred from steamer to barge at Port Elizabeth. Up to the present the Yorkshire Electric Transformer



A "Yorkshire" transformer arriving at Port Elizabeth

Co., Ltd., has sent fifty-seven transformers by this route for service at Port Elizabeth and several inland cities of South Africa.

Social Events

The Electrical Trades' Commercial Travellers' Association annual dinner-dance was held at the Criterion Restaurant, W.1, on Friday last. There was an increased attendance, totalling 134. The chairman, Mr. L. Ashman, in a brief speech, mentioned that the E.T.C.T.A. had inducements to offer commercial travellers in the form of a Sick Benefit and Thrift Society and an unemployment insurance scheme. Thanks to their benevolent fund it had been possible to help extreme cases of distress among their members. After dinner a cabaret show was given, and this was followed by dancing.

The annual staff dinner of the Electric Construction Co., Ltd., was held recently at the Victoria Hotel, Wolverhampton, Mr. W. M. Furniss (director and manager) being in the chair. Other directors present were Mr. J. Gray (chairman and managing director), Mr. David Willock and Mr. G. Spencer Hawes, and the company included a contingent from the London head office. "The E.C.C." was proposed by Mr. W. N. Ringrose and replied to by Mr. Gray. Short speeches were made by Messrs. Bridgett, Furniss, Spencer Hawes, Willock and E. Gledhill. The speeches were interspersed with musical items, and later there was community singing.

The annual dinner of the staff of Collins Electrical, Ltd., was held recently at Pritchard's Restaurant, W., over one hundred being present, under the chairmanship of Councillor C. F. Collins. The chairman, in a brief speech, said that over 70,000 machines had been repaired since the inception of the company, some of which were as large as 5,000 kW. The success of the company was largely due to the team spirit which existed amongst all connected with the firm.

The annual staff dinner of the Douglas Corporation Electricity Department was held recently, Mr. Bertram Kelly, borough electrical engineer, presiding. In responding to the toast of the Electricity Department, Mr. Kelly said last year they sold 8 or 9 per cent. more electrical energy than in the preceding year, and he was sure that, when the accounts for 1931-32 were completed, it would be found that the output showed a further big increase.

International Action on Unemployment

The Assembly of the League of Nations has adopted a resolution asking the constituent Governments to submit concrete proposals relating to public works such as will better the conditions of life in countries where unemployment is serious or whose national equipment is insufficiently developed. Works entailing the employment of a very large amount of labour should not be undertaken, the League Committee of Inquiry considers, unless their execution will help to bring about an improvement in the present economic crisis. It has been frequently pointed out in the ELECTRICAL REVIEW that our industries are insufficiently electrified. We note that Sir John Brooke, C.B., vice-chairman of the Electricity Commissioners, represents Great Britain on the Committee of Inquiry, and we may assume therefore that the economic value of intensive electrification is in the minds of our Government.

The Marking of Imported Insulating Tape

A draft Order in Council under the Merchandise Marks Act, 1926, requiring the marking of imported insulating tape, has been laid before Parliament. This requires that an indication of origin shall be applied to each roll of tape by stamping, printing, stencilling, impressing or embossing as follows: (1) When the roll is sold or exposed for sale contained singly in a box, carton, or other container: On the box, carton or other container or on a label securely affixed thereto. (2) When the roll is sold or exposed for sale wrapped singly in paper, tinfoil or the like covering, but with no container as in (1): On the outside wrapping of each roll, or on a label securely affixed thereto. (3) In all other cases: On a label securely affixed to the side of the roll.

Goods to which this Order applies shall bear the indication of origin on exposure for sale wholesale only if the person so exposing the goods is not a wholesale dealer, and the goods are not required to bear an indication of origin at the time of importation. It is proposed that the Order shall come into force three months after the date on which it is made.

The Marking of Portable Lamp Casings

The Board of Trade has referred to its Standing Committee an application for an Order-in-Council to require the marking with an indication of origin of imported casings for dry or secondary battery portable electric lamps, lanterns, and torches, whether fitted with a battery or not.

Recent Contracts

As part of a scheme to augment the electric suburban services between Euston and Watford and Broad Street and Watford, the London, Midland and Scottish Railway Co. has placed an order with the General Electric Co., Ltd., for a generating set for use at the Stonebridge Park power house. The contract includes a 20,000-kW turbo-alternator, a condensing plant, and auxiliary machinery. Work will proceed immediately and delivery is to be completed by the autumn of 1932. Other contracts provide for the installation of additional plant at sub-stations.

Messrs. Bertram Thomas have received an order for two triple electrically controlled end cell regulators complete with controllers and remote indicating devices for dealing with two batteries each having a capacity of 18,000 A for one hour or 36,000 A for ten minutes, from the Goteborg Stads Elektricitetsverks, Sweden.

A Chloride Exhibit

The accompanying illustration shows the stand of the Chloride Electrical Storage Co., Ltd., at the recent Public Works, Road and Transport Exhibition, on which was demonstrated the "Keepalite" emergency lighting system for ser-

A Chloride demonstration

vice in places where a failure of the normal lighting supply might have serious results. The principal feature was the operating table illuminated by a special type of lighting fitting seen on the right of the picture.

Osram Lamp Works Visits

A large gathering of members of the London branch of the Electrical Contractors' Association, including the president, Mr. W. R. Rawlings, and Mrs. Rawlings, recently visited the Osram Lamp Works and Research Laboratories of the General Electric Co., Ltd. The Hammersmith works were toured during the morning, and the Wembley works and Research Laboratories were inspected in the afternoon. The visitors were entertained to luncheon, Mr. C. Wilson, director of the Osram Lamp Works, occupying the chair.

Members of the Chief Technical Assistants' (Central Stations) Association visited the Hammersmith works and Wembley on November 16th.

Proposed Amalgamation

In our issue of November 20th (p. 785), we reported a meeting of the creditors of Hollings & Guest, Ltd., and John Hands and Sons, Ltd. The controller and committee who were appointed at this meeting have now reported on the position, and they recommend the amalgamation of the two companies and the novation of their debts with the combined undertaking as at October 31st last. Other proposals put forward at the meeting were also recommended for acceptance.

Wiremen Strike at West Ham

About 150 men and boys employed in the wiring and mains section of the West Ham Electricity Department came out on strike on November 21st, refusing to return to duty until a certain employé was removed from the Department. It seems that a dispute had arisen between the employé referred to and the eastern branch of the Electrical Trades Union, of which he is, or was, a member. Although the Electricity Department could not agree to the removal of the employé, it was decided to appoint a special committee to investigate the trouble. After some consideration the men returned to work on November 25th.

Agreements with American Furnace Manufacturers

Birmingham Electric Furnaces, Ltd., have recently entered into an agreement with the Electric Furnace Co., Salem, Ohio, providing for the fullest interchange of technical information, designs and patent rights relating to electric heat treatment. By another agreement the company has obtained the patent rights in Europe and British Dominions of C. I. Hayes, Inc., Providence, R.I., U.S.A., respecting its "Certain Curtain" method of atmosphere control, which enables the heating of high speed and other steels to be effected without scaling.

Recent "Bastian" Installations

A number of their electrode boilers have recently been supplied for various installations by Messrs. Bastian & Allen, Ltd. At the Royal Scottish Automobile Club, Glasgow, the company undertook the whole of the heating, hot water and steam supply work (see ELECTRICAL REVIEW, October 2nd, p. 495), while a 120-kW boiler has been installed at the new Masonic Peace Memorial, London. The electrical thermal storage equipment for the Parkland Garage belonging to the Glasgow Corporation Transport Department was also supplied by the company, the actual installation of the apparatus (as well as the ventilating plant) being carried out by the Anemostat Co., Ltd.

Industrial Welfare Society's Meeting

The fourth annual general meeting of the Industrial Welfare Society (Incorporated) was held on November 25th at 51, Palace Street, S.W.1, the chair being taken by H.R.H. the Duke of York, who is the president.

The Galloway Scheme

The contract for the barrage work in connection with the Galloway hydro-electric scheme has been placed with Messrs. Howard Bros., of Poole. This is the first contract for the scheme, which will involve the expenditure of several millions.

Factory Floodlighting

An interesting installation recently completed is the floodlighting of the Aladdin Industries factory at Greenford. The installation was designed by Siemens Electric Lamps & Supplies Co., Ltd., and carried out with seven of the company's wide-angle units and twenty-three concentrating beam projectors. The lamps employed were 1,000-W size, of both projector and standard types. The tower is flooded with light from various angles, so that it stands out as a prominent feature. The wiring work was carried out by Messrs. J. Briggs, Electrical Contractors, Ltd.

The British Industries Fair

High hopes for a British Industries Fair even more successful than those of previous years were held out in a statement made on Tuesday by Major J. Colville, M.P., secretary to the Department of Overseas Trade. Recent developments in the world's exchange rates, he said, have given British manufacturers an exceptional opportunity in overseas markets, and the applications for space at the 1932 Fair have fully reflected their appreciation of this opportunity. It is already certain that the Fair will exceed 600,000 sq. ft. of exhibiting area and it is anticipated that there will be 2,000 exhibitors.

The Department of Overseas Trade has been studying the possibilities of arranging special facilities for overseas visitors and the railway and shipping companies have co-operated to this end in granting reduced fares. Major Colville is a strong supporter of the "Buy British" campaign, and implores the British manufacturer, and particularly the exhibitor at the Fair, to leave no stone unturned to discover British sources of supply for his raw materials and his semi-manufactured component parts.

E.T.B.I. Ball at Newcastle

There was an excellent attendance at the annual ball of the North-East Coast Section of the Electrical Trades Benevolent Institution, which was held last Friday at the Grand Assembly Rooms, Barras Bridge. The guests, who included the Lord Mayor and Lady Mayoress, as well as most of the leading electrical engineers in the neighbourhood, were received by Mr. R. P. Sloan, president of the Section, and Miss Sloan. One of the most popular features of the evening was the Divining Disc Competition, the disc making 45,575 turns during its three hours' run. The winner was Miss E. Whitehead, who won £10 with a guess of 45,555. Up to last Saturday the competition had earned £74 towards the funds of the Institution after paying all expenses.

Great Britain's Radio Exports

According to statistics published in the *Wireless and Gramophone Trader*, the value of radio goods exported from this country during October amounted to £103,994, an increase of approximately 45 per cent. on the figure for the preceding month (£71,213). Advances were shown in every section of the industry, the most prominent examples being under the headings "valves" (£22,608, as against £15,248 in September), "other parts and accessories" (£47,477, as against £28,633) and "electrical and radio gramophones" (£12,461, as against £7,895). For the ten months January-October the total value of the exports was £814,203.

American Radio Exports

During August the value of radio receivers and apparatus exported from the United States amounted to £450,192, as compared with only £374,874 in the corresponding month of last year. For the eight months ended August last the total value, at £2,721,340, shows an increase of £340,305 as compared with the corresponding period of 1930. Complete receivers were responsible for £1,701,850 (£1,116,660 in January-August, 1930) of the total and were in fact the only goods showing an increase.

A G.E.C. Window Display

As a practical aid to electrical contractors and traders, the General Electric Co., Ltd., has staged at Magnet House, Kingsway, a model window display of "Magnet" electrical appliances suitable for Christmas presents. An illustration of this model arrangement is being sent out to the trade, together with the company's usual Christmas gift poster.

New Tunisian Power Station

The Department of Maritime Works is to construct a power station at Bizerta, and will shortly invite tenders for the civil engineering works and for the supply and erection of a 10-ton travelling crane. Further particulars may be obtained from the Department of Overseas Trade (Ref. G. 10950).

For Sale

The freehold factory, plant and machinery, belonging to Dyer & Young, Ltd., at Stansted, Essex, will be sold by auction by Leopold Farmer & Sons, on December 15th.

Shop premises, together with stock of electrical and radio goods, confectionery, &c., are offered for sale at Shrewsbury by Messrs. Whitfield & Ryley.

(See our advertisement pages to-day.)

Trade Announcements

A new wholesale stores depôt has been opened by Mr. Arthur Walkington at Temple Buildings, 8a, Pepper Street, Nottingham, and he asks for catalogues of electrical goods.

The Yorkshire Electric Transformer Co., Ltd., announces that it has appointed Thompson & Co., 1 and 3, Old Swan Lane, E.C.4, as its representative for London and the Home Counties. The latter's telephone number is "Mansion House 6120."

Messrs. Marsh Bros., Electricians, Ltd., have erected new offices at their works, Clough Bank, Sheffield, and the registered office of the company has been moved to that address. The telegraphic address and telephone numbers remain unchanged.

Mr. L. T. Sykes, of 5, Edgar Avenue, Mansfield, has acquired the electrical and heating departments of the business of Saville and Co., for whom he has been manager for twelve years.

Hints for Commercial Visitors

A further addition to the "Hints for Commercial Visitors" series, issued by the Department of Overseas Trade (Ref. C. 3699) relates to Chile, and contains the usual information regarding travelling facilities, internal communications, &c.

The Chinese Purchasing Commission

Dr. C. Wang, director of the Chinese Purchasing Commission, whose business it is to lay out £3,000,000 of the British Boxer Indemnity on the purchase of railway and engineering material in this country, has just returned to London from his mission in Italy. In conversation with *Reuter's* diplomatic correspondent, Dr. Wang said that the work of the London Commission was progressing splendidly. A considerable amount of railway and electrical material had been purchased, the exact quantity being difficult to appraise, as there were so many outstanding orders. A steady stream of orders was being received from China, and these were being smoothly executed with all possible speed, and all the material required was being obtained from British engineering and manufacturing firms.

Czecho-Slovakian Electrical Imports

The value of imports of electrical machinery and apparatus into Czecho-Slovakia during September last was 25,611,000 crowns, bringing the total for the first nine months of the current year to 193,457,000 crowns.

Prices of Materials

Messrs. F. Smith & Co. report, December 1st: Electrolytic copper h.c. wire, 6 15-16d., ¼d. increase. Silicium bronze wire, 8¼d., 3-16d. increase.

Messrs. Edward Till & Co. report, December 2nd: India-rubber, Para fine, no change.

Messrs. James & Shakespeare report, December 2nd: Copper bars (best selected), sheet and rod, £72, £2 inc.; English pig lead, £16 15s., 10s. inc.

New Catalogues and Lists

W. T. Glover & Co., Ltd., Trafford Park, Manchester.—List No. 25, giving illustrations and details of the "Glo-clad" wiring system.

Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.—Leaflet No. 1013, describing automatic motor starters with overload and phase-failure protection.

Power Plant Co., Ltd., West Drayton, Middlesex.—A useful little booklet containing fifty sheets of graph paper.

Walker Bros. (Electrical Engineers), Ltd., Temple Row, Birmingham.—A number of the "Electrical News" containing suggestions for electrical Christmas presents.

Wootton & Co., Ltd., Alma Works, Ponders End.—A trade price list of electrical woodwork.

C. W. Outram & Co., Ltd., Woodville.—An illustrated leaflet describing two new ceiling roses.

Premier Electric Heaters, Ltd., Keeley Street and St. Andrew's Road, Birmingham.—A folder illustrating "Premier" domestic appliances suitable for Christmas presents.

Sun Electrical Co., Ltd., 118 and 120, Charing Cross Road, W.C.2.—A 232-page catalogue of radio receivers, components, and accessories.

Queen's Engineering Co., Ltd., 60-62a, Queen's Road, Battersea, S.W.8.—A stock list of new and reconditioned a.c. and d.c. motors.

Geo. Barnard, 1, Nile Street, and Sheepcote Street, Birmingham.—An illustrated catalogue of "Vinculum" materials for electrical work.

Callender's Cable & Construction Co., Ltd., 2, Surrey Street, Strand, W.C.2.—Pamphlet No. 116, giving particulars of the "C.R.1" joint box compound.

Marconiphone Co., Ltd., 210-212, Tottenham Court Road, W.1.—Service manuals relating to the model "66" portable receiver and the company's automatic record-changing mechanism.

English Electric Co., Ltd., Stafford.—Publications N.23 and N.25, dealing respectively with flameproof switch pillars and mercury arc rectifiers.

Superheater Co., Ltd., Bush House, Aldwych, W.C.2.—An illustrated booklet relating to "M.L.S." superheaters.

L. G. Hawkins & Co., Ltd., 30-35, Drury Lane, W.C.2.—The December issue of the "Link" containing suggestions for electrical gifts for Christmas.

Private Arrangements

G. Gibson & Co., wholesale electrical suppliers, 35, East Street, London, W.—A meeting of creditors was held at Winchester House on November 26th, Mr. Houstoun (representing the largest creditor) occupied the chair. Mr. Walsh, on behalf of the debtor, said that owing to lack of time he had been unable to supply a statement of affairs. His investigation, so far as it had gone, however, disclosed liabilities amounting to £2,185, with total assets of £1,111. No definite proposal was made, and it was resolved that the estate should be administered under a deed of assignment to be executed to Mr. W. A. J. Osborn, of Messrs. Corfield & Cripwell, Finsbury Pavement, E.C. A committee of inspection was also appointed, consisting of Mr. F. W. Evans, Mr. Judd, Mr. E. H. Hawkins, the representatives of the General Electric Co., Ltd., and Messrs. Bernard & Co. The following are the principal creditors:—

	£		£
Rhineland Cable Co. ...	177	General Electric Co., Ltd.	96
Metallic Seamless Tube Co.	215	M.K. Electric, Ltd. ...	69
Grothe & Sohne	58	National Electric Co. ...	144
		Bernard & Co.	53

Dissolutions of Partnership

Palmer & Bailey, dealers in electrical apparatus, wireless receivers, etc., 578, High Road, Streatham, S.W.—Messrs. R. T. Bailey and W. E. Palmer have dissolved partnership. Mr. Bailey will attend to debts.

Carlux Electrical Service, electrical engineers, etc., 17, Nicholas Street, Chester.—Messrs. T. M. Good, F. Ranson, J. Ranson, N. Ranson, and G. W. Finch have dissolved partnership so far as concerns Mr. Finch, who has retired from the firm.

Bankruptcy Proceedings

D. O. Peach, 2, Ampton Street, W.C.—The public examination of this debtor was held on November 24th before Mr. Registrar Mellor at the London Bankruptcy Court, the accounts showing liabilities of £178, against assets of £5. Replying to Mr. F. Vyvyan, Official Receiver, the debtor stated that in the first instance, as a spare time occupation, he arranged to construct wireless sets, from materials supplied by a dealer, for which he received 10s. per set, and with parts obtained from the dealer on credit he constructed other sets for his own disposal. In November, 1930, in co-operation with two partners who were to sell the goods and provide capital respectively, he agreed to construct wireless sets, the profits and losses to be shared equally. Only three sets were constructed, all of which remained unsold, and being threatened by creditors he filed his petition. The examination was concluded.

City Machine Co., wireless and gramophone dealers, 23, Brunswick Place, City Road, E.C.—A sitting of the London Bankruptcy Court was held on November 26th before Mr. Registrar Warmington for the public examination of G. Roffe and C. S. Stracey, trading in partnership. The firm failed last July with liabilities of £2,857 against assets of £490. The Official Receiver reported that the debtor Stracey had not attended under the proceedings and the public examination of that debtor was adjourned *sine die*. Roffe attributed his failure to insufficient capital, heavy overhead expenses, bad trade, bad debts and misappropriation of stock by a buyer. The sitting was adjourned till January 28th next for accounts to be lodged.

J. L. Goldsman, radio engineer, 100, High Holborn, W.C.—Application for discharge to be heard at Bankruptcy Buildings, Carey Street, W.C., on December 17th.

R. Ramsden, wireless and electrical contractor, 29, Gibbet Street, Halifax.—Last day for receiving proofs for dividend, December 9th. Trustee, Mr. J. O. Morris, 12, Duke Street, Bradford, Official Receiver.

A. S. Deacon (London Wireless Co.), 32, London Road, Derby.—First and final dividend of 1s. 4½d. in the £, payable December 3rd, at Midland Chambers, Warwick Passage, Corporation Street, Birmingham.

G. H. Hansen, electrical engineer, 50, Park Road, Peterborough.—First and final dividend of 9¾d. in the £, payable November 30th at the Official Receiver's office, 41, Sidney Street, Cambridge.

J. S. Blackburn, electrician, Borough Street, Castle Donington.—Last day for receiving proofs for dividend, December 12th. Trustee, Mr. L. A. West, 22, Regent Street, Park Row, Nottingham, Official Receiver.

A. K. Kingston, wireless manufacturer and engineer, Graham House, 9, Newman Street, W.—Application for discharge to be heard on December 10th at Bankruptcy Buildings, Carey Street, W.C.

J. H. Noble, electrical engineer and contractor, 12, High Bridge, Newcastle-on-Tyne.—Trustee, Mr. R. K. Clark, 81, St. Mary's Place, Newcastle-on-Tyne, Official Receiver, released October 16th.

Company Liquidations

Picturetone, Ltd., electrical apparatus manufacturers, 11D, Regent Street, W.—At the statutory meeting of creditors on November 27th a statement of affairs was presented showing ranking liabilities of £8,049, of which £6,399 was due to the trade and £1,650 to cash creditors. In addition, there was a fully secured creditor for £900. After allowing £225 for preferential claims, the net assets were £4,534, leaving a deficiency as regarded the creditors of £3,514. The company was registered in February, 1930, with a nominal capital of £1,000, all of which had been issued and was fully paid. Negotiations were proceeding for the formation of a new company, which would take over certain of the assets and carry on in connection with the servicing of the hire-purchase agreements. It was hoped the new company would be formed within a few days. No resolution was passed and the voluntary liquidation of the company is to be continued, with the liquidator appointed by the shareholders—Mr. W. E. Fitzhugh, 120, Moorgate, E.C.

Bloomsbury Wireless Co., Ltd., 9, Old North Street, Bloomsbury, W.C.—The statutory first meetings of creditors and shareholders of this company (in compulsory liquidation) were held on November 26th. The failure of the company was attributed to the decreased demand for wireless sets and parts, and to severe competition by several neighbouring shops opened after the company commenced business. The liabilities were returned at £417 and the receiver for a debenture holder reported that he had sold the stock and fittings for £158, which would be absorbed in the debenture claim. Consequently there could be no return to the unsecured creditors or the shareholders. The liquidation was left in the hands of the Official Receiver.

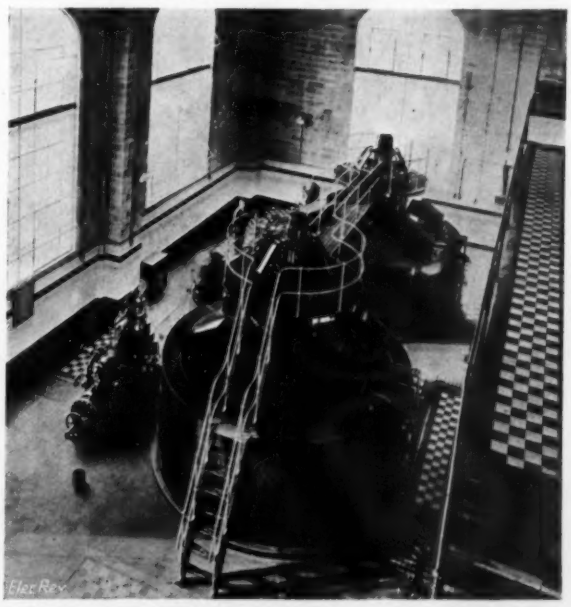
Electradio Co., Ltd., 25, Westbourne Grove, W.—The accounts lodged under the compulsory liquidation of this company show unsecured debts, £2,733; loans on debentures, £1,504; assets, £226; and a deficiency of £5,274 with regard to contributories, the issued capital being 1,000 ordinary shares of £1 each. The Official Receiver (who is acting as liquidator), reports that on March 4th, 1931, Mr. Stephen Croft was appointed receiver on behalf of the debenture holders; he had sold the stock, furniture and fittings for £226, so there was no prospect of any funds becoming available for the unsecured creditors. The failure of the company is attributed to lack of working capital, interest on loans, a decline in trade during the last eight or nine months, and loss by fire.

W. T. Hodge & Co., Ltd.—Particulars of claims by December 31st to the liquidator, Mr. N. A. Denson, Midland Chambers, 3, Warwick Passage, Corporation Street, Birmingham.

Sharratt Electrical Co., Ltd.—Meetings, December 31st at the offices of Messrs. Hartley, Son & Coupe, Town Hall Chambers, Rochdale, to receive an account of the winding-up by the liquidator, Mr. J. L. Fielding.

Venezuela Telephone & Electrical Appliances Co., Ltd.—Meeting, December 30th, at Donington House, Norfolk Street, W.C., to receive an account of the winding-up by the liquidator, Mr. G. Forbes.

Jaxons, Ltd.—Winding up voluntarily. Liquidator, Mr. F. W. Davis, 28, Theobalds Road, Bedford Row, W.C.



General view of alternator room of the Rannoch station

Electricity Supply

Lighting, Domestic, Power

Australia.—WESTERN AUSTRALIAN UNDERTAKING.—For the year ended June 30th last the total revenue of the Western Australian Government's electricity undertaking amounted to £280,715, which compares with £304,015 in the preceding year. Working expenditure totalled £212,076, as against £227,654, and there was a net profit of £7,717 (£16,869). During the year £11,904 was spent on capital account raising the total invested in the undertaking to £1,265,215. Sales of electrical energy declined from 76,138,881 to 69,879,057 kWh, and the maximum load from 21,500 to 20,000 kW.

Barnstaple.—EXTENSIONS TO YEO VALE.—The Town Council has decided to extend the electricity supply to the Yeo Vale district of the town at an estimated cost of £1,150.

Birkenhead.—LOANS SANCTIONED.—The Corporation Electricity Committee has obtained sanction to the borrowing of £5,000 for sub-station equipment, and £3,060 for the feeder main required for the supply of the new Mersey Tunnel.

Blackpool.—ADMINISTRATION.—By a decision of the Corporation General Purposes Committee last week, the Transport and Electricity Department is to be divided into two departments as from September 1st, 1932.

Blandford Forum.—SPECIAL ORDER.—The Blandford Forum and District Electricity Supply Co., Ltd., has applied to the Electricity Commissioners for a Special Order providing for the suspension of the rights of the Corporation to purchase the electricity undertaking.

Canada.—PROGRESS OF BEAUHARNOIS SCHEME.—In compliance with the insistent demands for power for Montreal and district, work on the Beauharnois power canal has been actively conducted during the season, employing some 4,000 men. Operations are well ahead of schedule time, and three-quarters of the construction is completed. The power house was finished during October last. The installation of the first two 50,000-h.p. turbines has been completed, and the third and fourth units are now being installed. About 90 per cent. of the rock excavation required for a 500,000-h.p. installation has been completed. The tail race has been finished and the water of the St. Lawrence has been admitted. Excavation work in the bed of the canal is progressing, and has proceeded nearly far enough to provide an adequate flow of water through the turbines for the initial 200,000-h.p. installation.

FURTHER HYDRO-ELECTRICAL DEVELOPMENTS.—The Provincial Government of Quebec has authorised the granting of a 75-year lease to the Gatineau Power Company of an 80-mile stretch of the Ottawa River between the dam on the Temiskaming and Alouette Lake, on which the company intends within the next few years to erect a number of power units. The granting of the lease is subject to the ratification of an agreement between the Federal Government, the Ontario Hydro-Electric Power Commission, and the Quebec Government. The Gatineau Company undertakes to reconstruct the Temiskaming dam if the Federal Government does not decide to do so in order to maintain the present flow of the river.

Clitheroe.—EXTENSION SCHEME DEFERRED.—The proposal of the Corporation to extend its electricity supply area to the districts of Chipping, Little Mitton, and Hurst Green, has been examined by the Clitheroe Rural District Council, which, mindful of the fact that an electrical scheme is being executed at Longridge, has decided to withhold its decision for a month. In the meantime inquiries are being made regarding the Longridge electrical works.

Continental.—ITALY.—A concession has recently been granted by the Italian Government to the Società Lombarda per Distribuzione di Energia Elettrica to establish a large hydro-electric station to utilise the power of the River Mallero in the province of Sondrio.

FRANCE.—Figures relating to electricity production in power stations exceeding 1,000 kVA installed capacity are now available. The aggregate kW of generating plant installed was 7,453,000 (5,242,000 thermal and 2,211,000 hydro). Thermal stations generated 8,210 million kWh and hydro stations 6,142 million; net imports amounted to 403 million, making a disposable total of 14,835 million kWh. Of this 10,582 million kWh was supplied at high voltage and 2,227 million at low voltage, losses in transmission, etc., accounting for 2,054 million kWh. Traction required 904 million kWh, electro-chemistry and metallurgy 2,874 million, other high voltage uses 6,837 million, lighting and domestic 1,260 million, and low-voltage power 967 million. The consumption per head of the population (41 million) was 312 kWh, and for lighting only 40 kWh. At January 1st, 1931, rather more than three and a half million persons lived outside the range of any supply network. More than 100 million kWh were distributed from twenty-one networks, between fifty and 100 million from twenty-eight networks, and between twenty and fifty millions from forty-one networks. These ninety systems accounted for 6,492 million kWh.

AN ALL-EUROPEAN ELECTRICITY SUPPLY PROPOSAL.—During the course of the recent meetings of the commission appointed to consider the question of an economic union of European countries, the Belgian Government proposed that the question of an all-European electricity supply should be included among the matters to be considered. In furtherance of its proposal the Belgian Government has just submitted to the League of Nations in Geneva some additional views on the question. It considers that the League might consider, or at least cause to be considered, the establishment (according to requirements) of electric power transmission lines along specially chosen routes to form part of a general system of such lines working on a uniform standard throughout Europe.

Coventry.—LOAN.—The Corporation Electricity Committee is to apply for sanction to a loan of £16,000 for additional plant and mains extensions.

Crieff (Perthshire).—THE FUTURE ELECTRICITY SUPPLY.—The Town Council last week considered an application made by the Grampian Electricity Supply Co. to renew the powers of its subsidiary, the Crieff Electric Supply Co., Ltd., to erect overhead lines in the burgh. The Grampian Co. proposes to supply the town in bulk instead of generating electricity locally. The Council decided to give its consent to the continuance of the overhead system only on condition that the company reduces its lighting charge to below 8d. per kWh.

Darlington.—REDUCED CHARGES.—The following reductions in the charges for electricity are recommended by the Corporation Electricity Committee:—Heating and power during the four darkest months: From 1½d. to 1d. per kWh. Alternative "A" power charge: To £2 5s. per kW per annum. Alternative "B" power charge: First 1,000 kWh a quarter, 1d. per kWh; above 1,000 kWh, ½d. In addition a temporary reduction of 10 per cent. is recommended in the charges for electricity for all purposes during the quarter ending this month.

Dover.—MAINS EXTENSIONS.—The Town Council has received sanction to a loan of £2,000 for prospective expenditure on mains.

Guildford.—CHANGE-OVER.—The Town Council has approved the proposal of the Electricity Committee to change over another district from d.c. to a.c. Sanction to a loan of £1,418 for the purpose is to be applied for. It is also proposed to lay mains to the Paddocks Estate, Burnham, at a cost of £300.

Hull.—REWIRING OF THE LAW COURTS.—The Corporation Property Committee is to undertake the rewiring of the whole of the electric lighting installation in the Law Courts section of the Guildhall.

Ilkley (West Riding).—SPECIAL ORDER.—The Urban District Council is to apply to the Electricity Commissioners for a Special Order authorising it to extend its electricity supply area so as to include the town of Denton.

India.—DARJEELING.—*Indian Engineering* says that the Municipal Council has approached the Government of Bengal with a scheme for the extension and improvement of the electricity supply system in Darjeeling and has asked for a loan. The Government of Bengal has also received from a large British corporation an application for a licence for the supply of electricity in Darjeeling.

Isle of Man.—THIRD READING OF ELECTRICITY BILL.—The Isle of Man Electric Light and Power Bill has passed its third reading in the House of Keys. The Bill gives the Government power to create an Electricity Board for the supply of electricity throughout the island with the exception of that part for which the Douglas Corporation is responsible. Should there be any deficiency in the working of the undertaking it will be met by a rate levied on the districts supplied.

Kettering.—EXTENSIONS.—The Town Council is to apply for sanction to a loan of £4,219 for the purpose of supplying electricity to Stoke Albany, Wilbarston, Middleton, and Cottingham.

Leeds.—RETAIL TRADING BY ELECTRICITY DEPARTMENT.—The Corporation Electricity Committee has received a letter from the Leeds Incorporated Chamber of Commerce supporting a resolution passed by the West Yorkshire Branch of the Electrical Contractors Association on the subject of the retail trading activities of the Electricity Department. Consideration of the matter has been deferred and a sub-committee has been appointed to visit Birmingham for the purpose of obtaining information on the subject.

London.—POPLAR.—In connection with the linking up with the grid system, the Borough Council Electricity Committee

Main control board at Loch Rannoch (*See pp.* 835-7)

has decided to make additions and modifications to switchgear at the Weston Street and Glaucus Street stations at a cost of £23,420.

STOKE NEWINGTON.—The Borough Council Electricity Committee recommends that the length of service cable laid free of charge on private property shall be increased from 30 to 60 ft.

BERMONDSEY.—The Borough Council has applied for sanction to a loan of £57,000 for electricity supply extensions.

Maidstone.—NEW MAINS.—The Town Council is to relay mains in Bower Mount Road at a cost of £1,373.

Manchester.—LOAN FOR SUB-STATIONS.—The Corporation Electricity Committee is to apply for sanction to a loan of £37,600 for the erection of sub-stations.

Overton (Salop).—SUPPLIES TO HANMER.—The Rural District Council has consented to an application of the Electricity Distribution of North Wales and District, Ltd., for an Order to supply electricity to Hanmer village and Gredington Hall.

Paisley.—YEAR'S WORKING.—The accounts of the Corporation Electricity Department (engineer and manager: Mr. W. Blair Smith) for the twelve months ended May 15th last, show a total revenue of £111,958, a working expenditure of £60,934, and a net profit of £1,966. During the year the capital expenditure amounted to £47,623, making a total of £735,732 now spent on the undertaking. Electrical energy sold increased from 13,161,074 to 13,808,218 kWh, and the maximum supply demanded from 6,100 to 6,200 kW. At May 15th the number of consumers was 1,759. The Central Electricity Board has now completed the erection of the grid sub-station at Blackhall, and supplies from this source have been taken since January 7th last. The power station plant has been closed down, but can be put into commission at any time if required.

Penrith (Cumberland).—SUPPLY AVAILABLE SHORTLY.—Preliminary work for supplying electricity to certain areas of the district is now almost completed and electricity will be available within the next few months.

Preston.—FUMES AND GRIT PREVENTION.—Following complaints concerning fumes and grit from the power station, the Town Council has decided to erect two 300-ft. chimney stacks at an estimated cost of £25,000.

Shipley.—NEW SUB-STATIONS.—The Urban District Council is to apply for sanction to a loan of £11,000 for the provision of sub-stations in Crag Road, Gaisley Lane, and Wrose Road, and for other requirements of the electricity undertaking.

Stoke-on-Trent.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains at a cost of £3,500.

REQUEST FOR SUPPLIES.—Tenants on the Kingsfield Estate, Basford, have asked for the installation of electric lighting in place of gas, and the matter has been referred to the Electricity Committee.

Twickenham.—MAINS EXTENSIONS.—The London and Home Counties Joint Electricity Authority proposes to lay mains in Pope's Avenue.

United States.—A 500,000-h.p. HYDRO-ELECTRIC SCHEME.—A new hydro-electric development at present under construction at Safe Harbour, Pa., is designed for an ultimate capacity of 504,000 h.p., the initial installation being six units. The turbines, which will develop 42,000 h.p. when operating under a head of 25 ft. at 109 r.p.m., are of the Kaplan type with movable runner blades operated by governor oil pressure. The sets are claimed to be the largest of their type yet built, the outside diameter of the runner being 18 ft. 4 in., and they will be arranged at 62-ft. centres in a single row.

Wheaton Aston (Stafford).—INAUGURATION OF SUPPLY.—A supply of electricity to serve the villages around Wheaton Aston was switched on by Councillor H. Southan, chairman of the Wolverhampton Electricity Committee, on November 27th. The ceremony marked the completion of the second instalment of the Wolverhampton Electricity Department's scheme for the electrification of the rural area on the north-west side of the borough. Nearly 100 sq. miles are now served by the Department.

Legal

Overhead Lines: Compensation for Landowners

MR. JUSTICE MACNAUGHTEN, in the King's Bench Division on November 25th, heard an action brought by the West Midlands Joint Electricity Authority, against the Willey Estates Co., Broseley, Shropshire, the Rev. C. S. Jackson, Broseley, Shropshire, Mr. J. Todd, Mill Hill, Brompton, Northallerton, Yorks, and Mr. W. J. Pitt, for a declaration that the Ministry of Transport, in giving its consent under Sect. 22, Electricity Act, 1919, to the placing of an electric line across any land, was entitled to give such consent subject to conditions as to the payment of wayleave. The defence was that the plaintiffs' action was *ultra vires*.

The Attorney-General (Sir William Jowitt) explained that this was a consolidated action, as the interests of the Minister of Transport and the West Midlands Joint Electricity Authority were identical. The point turned entirely on the construction of an Act concerning the right of the plaintiffs to place an electric line over land belonging to defendants. The point was of national importance as it was in the interests of the country that there should be a cheap and abundant supply of electricity. The Electricity Supply Act, 1919, gave power to such authorities as the plaintiffs to place their lines over other people's land. If consent of the owner was refused the Minister of Transport had power to give that consent by statute and to decide what terms and conditons should be imposed for rental per year.

The Minister's Powers

The question that arose was as to the terms and conditions. The plaintiffs said that the Minister, in giving consent, could make terms, including pecuniary terms and conditions. The defendants refuted that view and said that the case was within the Acquisition of Land (Assessment of Compensation) Act, 1919. That Act received the Royal Assent in August and the Electricity (Supply) Act in December. If the two Acts were inconsistent the latter would prevail.

If in every case there had to be not only a public inquiry for the Minister to give his consent, but also an arbitration as to compensation, there would be very serious overlapping and expense.

The lump sums claimed by the defendants were as follows: Mr. Pitt £400, the Willey Estates Co. £640, Mr. Jackson £40, and Mr. Todd £280. The Minister had awarded the following annual rents: to Mr. Pitt £2 5s., to the Willey Estates Co. £7 5s., to Mr. Jackson 4s., and to Mr. Todd £2 4s.

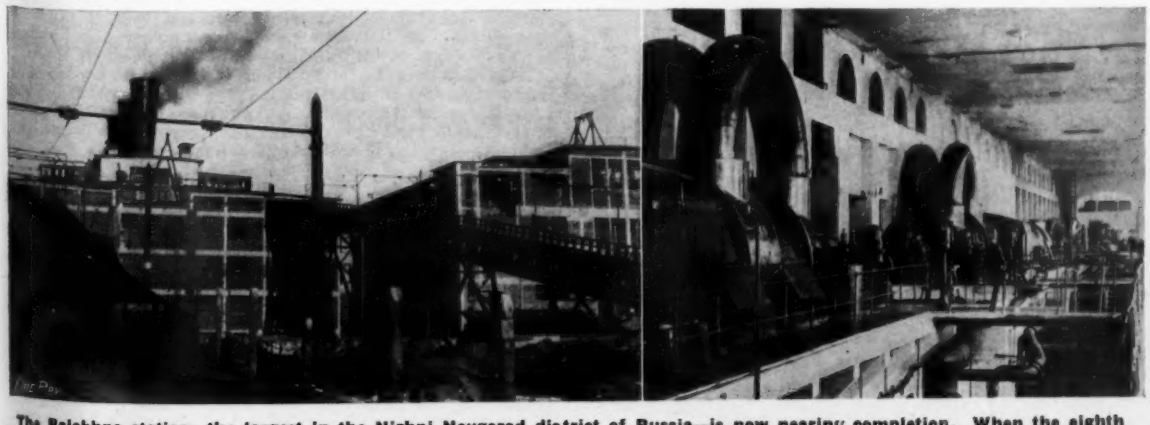
Mr. Tyldesley Jones, K.C., for the defendants, said that if the matter went to arbitration his clients would considerably increase the amounts of their claims over the sums mentioned.

Assessment of Compensation

The Attorney-General, proceeding, traced the progress of legislation relating to compensation from the Land Clauses Act, 1845, to the Acquisition of Land (Assessment of Compensation) Act, 1919. He said that the latter Act only applied to the acquisition of land by a public authority, and if a joint electricity authority was not a public authority within the Act, the defendants would seem to be in a difficulty. It would be strange if different procedure had to be adopted according as to whether the lines were carried by a public authority or by private undertakers.

Mr. T. Jones submitted that the case was not as simple as the Attorney-General had stated. The Minister was claiming that Parliament had conferred on him the exclusive right to say whether a man might have his land utilised without a penny of compensation. If the argument for the Minister was right, he was the supreme authority as to land tenure in the country. The main question was not whether "terms" included pecuniary terms, but whether the Minister had the exclusive right which he claimed. It had been held in decided cases that "an intention to take away the property of the subject without giving him a legal right to compensation for the loss of it is not to be imputed to the Legislature unless that intention is expressed in unequivocal terms."

The hearing was adjourned *sine die*.



The Balakhna station—the largest in the Nizhni Novgorod district of Russia—is now nearing completion. When the eighth and final turbine is installed it will have a total capacity of 200,000 kW. One of its largest customers is the Balakna paper combine

Traction

Australia.—WESTERN AUSTRALIAN GOVERNMENT TRAMWAYS.—The annual report of the Commissioner of Railways states that for the year ended June 30th last the total revenue from the Government tramways amounted to £304,051, a decrease of £45,219 as compared with 1929-30. Working expenses declined from £294,471 to £260,997, and there was a net loss of £9,367, as against a net profit of £3,277 in the preceding year. The total capital invested in the undertaking at June 30th last was £1,103,707, of which £9,550 was spent during the year under review. There was a decrease from 35,565,867 to 31,180,072 in the number of passengers carried, while the car mileage fell from 3,604,827 to 3,345,590.

Bradford.—PROPOSED WITHDRAWAL OF TROLLEY-'BUS SERVICE.—An arrangement has been reached between the Corporation Tramways Committee and the West Yorkshire Road Car Co. whereby the Corporation will withdraw its trolley-'bus service on the Bolton Woods route and the company will discontinue its 'bus service between Bradford and Clayton.

ABOLITION OF WEEKLY PASSES.—As part of an effort to overcome the continued heavy deficit on the tramway undertaking, the Corporation Tramway Committee recommends the abolition of all weekly passes except those costing 3s. 6d. and over.

Continental.—ITALY.—A good deal of attention is being devoted in Italy to the use of trolley-'buses in place of tramways and petrol-'buses. One of the first trolley-'bus lines in Italy is that which has been in use in the town of Vicenza for about three years, with vehicles of Italian construction. The Società Tranvie Elettriche Bresciana put two English vehicles into service in February last between the railway station and town of Desenzano. The running of these vehicles is an experiment which is being closely watched by the Bresciana Co. The company operating the municipal tramways in Turin has also recently started a trolley-'bus service between Ponte del Gatto and Cavoretto. The chassis of the vehicles used were built in Italy by the Fiat Co. of Turin, while the electrical equipment was supplied by the Società Generale di Elettricita. Vehicles supplied by the same two Italian concerns are also about to be put into service in the town of Cuneo.

SPAIN.—The Sociedad Espanola de Construccion Naval, whose electrical engineering department is working in collaboration with the Metropolitan-Vickers Electrical Co., Ltd., has recently completed the construction at its works at Reinosa, Santander, of an electric express locomotive for use on the railway between Alsasua and Irun. The engine, which can attain a speed of nearly 70 m.p.h. and weighs 150 tons, is equipped with six motors operated by d.c. at 1,500 V.

Darlington.—TROLLEY-'BUS EXTENSIONS.—The Corporation Electricity and Transport Committee recommends a further extension of the trolley-'bus system along Coniscliffe Road to a point about half a mile beyond Salutation Corner.

Gravesend.—TRAFFIC SIGNALS.—The Corporation is to provide traffic signals for Bath Street and High Street.

Leatherhead.—AUTOMATIC TRAFFIC CONTROL.—Experiments with automatic traffic control signals are to be made at Swan Corner.

L.M.S. Railway.—COLOUR-LIGHT SIGNALLING.—The scheme for the provision of three aspect colour-light signalling between Euston and Watford is now well advanced. By means of the new system a substantial increase in the train services will be made possible, and a greater degree of punctuality will be obtained during foggy weather.

London.—" STOP " SIGNALS FOR TRAMCARS.—The London County Council is experimenting with red " stop " signals for use on the back of tramcars.

POLICY OF THE UNDERGROUND RAILWAYS.—Speaking at the Court of the Traffic Commissioners on Monday with regard to recent applications made by Green Lines, Ltd., for licences to run a number of limited-stop services, Mr. Frank Pick, managing director of the Underground Group, said that it was not denied that to some extent motor coaches had diverted railway traffic, but it was not correct, as the railway companies appeared to think, that every coach passenger had been taken from the railways. During the last ten years a million more people had come to live in the outer areas of London. Those people required travelling facilities, and except for a few minor improvements and the electrification system by the Southern Railway, the railways as a whole had made no attempt to deal with that increase. It was unfortunate that there should be divided jurisdiction in dealing with road services in the London passenger transport area. The Underground Group was not opposed to any policy of co-ordination, and was of opinion that the public could be provided with what it wanted and that all forms of transport could be maintained upon a reasonable and remunerative footing when the full co-ordination outlined in the London Passenger Transport Bill was brought into effect.

Rothesay.—THE CONTROL OF THE TRAMWAYS.—The Scottish Motor Traction Co. has acquired a controlling interest in the Rothesay Tramways Co.

South Lancashire.—TROLLEY-'BUSES.—The South Lancashire Transport Co. is to apply to the Minister of Transport for a Provisional Order authorising it to operate trolley-'buses on a number of routes in Ashton-in-Makerfield, Hindley, Atherton, Leigh, Tyldesley-with-Shakerley, Worsley, Swinton-with-Pendlebury, Little Hulton, Kearsley, and Farnworth.

West Riding.—PROPOSED TRAMWAY ABANDONMENT.—A meeting of the Yorkshire (West Riding) Electric Tramways Co., Ltd., is to be held on December 16th to approve a plan for the abandonment of its tramway systems and the substitution of omnibuses.

Wolverhampton.—TROLLEY-'BUS SERVICE TO WALSALL.—A through service of trolley-'buses was inaugurated recently between Wolverhampton and Walsall. It is operated jointly by the two Corporations concerned.

Communications

Egypt.—TELEPHONY.—The Government purchased the company-owned telephone undertaking in 1918. In 1923 new equipment was installed in thirty-six towns, and trunk lines now connect them with the main cities. Sub-systems were provided in forty small towns, and public call boxes were brought into use. In 1926 telephone circuits were extended from Cairo to Suez and Palestine, and automatic equipment was installed for the first time in Cairo. Extensions and new automatic and manual exchanges have since been provided, and in 1931-32 automatic exchanges are to be installed at Heliopolis, Alexandria, Suez, and Port Said. It is estimated that the number of trunk calls made in 1930 totalled 2,761,379. Exchanges numbered 102, and public telephones 296. The total length of aerial lines was 305,152 km., and of trunk lines 36,194 km.

TELEGRAPHY.—In 1929-30 the number of messages sent was 2,831,093, an increase of 1,105,779 since 1917-18. The number of offices increased by 113 to 516, and the total length of lines by 1,105,779 km. to 2,831,093 km.

WIRELESS STATIONS.—The Alexandria and Abu Zaabal radio stations, owned by the British Government, were opened in 1921 and used mainly for communicating with England. In 1926 the Abu Zaabal plant was removed, and a station was installed by the Marconi Co. in place of it, as well as another at El Maadi. In 1929 two other stations were opened for public service at El Kosseir and El Arish, and in 1931 new stations were opened at Giza and at the oases of Siwa, Bahrieh, and Dakhlieh.

Hull.—PROFIT FROM TELEPHONES.—The municipal telephone service, which is operated under G.P.O. licence, made a profit of £8,000 during the last half-year.

India.—WIRELESS FOR RAILWAYS.—Radio communication between important railway centres is to be introduced in India, the Government Railway Board having ordered from the Indian Radio Telegraph Co., Ltd., four sets of Marconi short-wave apparatus. These services are expected to result in a financial saving as well as to provide a reliable alternative channel of communication when there is interference on the normal lines. The transmitters are of the " Type T.N.7a," which has a power of 250 W to the aerial and is capable of operation over a wave range of 20 to 135 metres. They will operate in conjunction with Marconi short-wave duplex telegraph receivers, " Type R.G.31a."

WIRELESS TELEGRAPHY.—Another step forward in India's system of communications was recently accomplished by the establishment of a radio-telegraph service between that country and Siam.

Irish Free State.—THE DRUMM BATTERY.—The special train constructed by the Great Southern Railway Co. for Drumm battery operation, made trial trips this week between Dublin and Bray, a distance of 26 miles. An average speed of 30 m.p.h. was maintained. The train is 135 ft. long and weighs 75 tons. It can accelerate twice as quickly as a steam train.

London.—TELEPHONE INSTALLATIONS INCREASING.—More people are using the telephone to-day than ever before in the history of the telephone service. In London, for example, the increase in the number of new telephone installations up to November 12th was at the rate of 800 a week, with a total increase since the corresponding date last year of no fewer than 41,525. In the same period the number of telephones in use throughout the provinces increased by about 60,000.

TELEVISION SERVICE EXTENSION?—The British Broadcasting Corporation has initiated discussions with Baird Television, Ltd., to explore the possibility of the more active participation of the B.B.C. in the provision of television transmissions both from the programme and technical points of view.

The Telegraph Service.—FINANCIAL LOSS.—The second report of the Select Committee on Public Accounts (Stationery Office, price 15s.) draws attention to the operating loss on the telegraph service. During the year ended March, 1930, it amounted to £772,789 on an operating income of £4,689,498, which represented an additional loss of £44,256 over the previous year, but the Committee understands that the increase in the deficit was due to a rise in the rate of bonus, and that under present conditions the loss will tend to fall. At the same time, it was made perfectly clear to the Committee that there was no prospect of the telegraph service paying its way. In reply to a question in the House of Commons, the Postmaster-General stated last week that for 1930-31 the telegraph deficit is expected to be £1,005,000, and the telephone service surplus £343,000.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Belgium.—BRUSSELS.—December 13th. Société Nationale des Chemins de Fer Belges (Division des Achats), 21, Rue de Louvain, Brussels. Supply and laying of underground armoured h.p. cable in the Malines district.

Cootehill (Irish Free State).—December 7th. Urban District Council. Centrifugal pumps and electric motors. Specifications, &c. (deposit £2), from Mr. P. A. McCarthy, 26, Lower Leeson Street, Dublin.

Dundee.—December 16th. Electricity Department. Reinforced concrete piled foundationing for coal- and ash-handling plant at Carolina Port generating station. Specifications, &c., from Mr. D. H. Bishop, general manager and engineer.

December 16th. Electricity Department. Cable. (See this issue.)

Durham.—Education Committee. Installation of electric lighting at the Waldridge Lane school and the Waldridge infants' school. Particulars from Mr. F. Willey, architect, 34, Old Elvet, Durham.

Edinburgh.—December 9th. Corporation. Various works for transformer house at Milton Road. Schedules from Mr. E. J. MacRae, city architect.

Farnworth.—December 5th. Urban District Council. L.p. pillar, disconnecting boxes, frames and covers. (November 27th.)

Greece.—ATHENS.—Fire Brigade Service. Telephones. (A.X. 11192.)*

Harrogate.—December 15th. Corporation. Overhead lines. (November 27th.)

Lanchester.—Guardians' Committee. Electric wiring at Institution. Particulars from Mr. W. J. Merrett, county surveyor, 43, Old Elvet, Durham.

Leeds.—December 8th. Public Assistance Committee. Twelve months' supply of electric lamps. Specification and form of tender from Mr. H. Fieldhouse, public assistance officer, 11, South Parade.

Lerwick.—December 18th. Town Council. (*a*) Oil engine driven generating plant, battery, switchgear, crane, distribution mains and public lamps; and (*b*) structural steelwork. Specifications (deposits £2 2s. for (*a*) and £1 1s. for (*b*)) from Mr. J. A. Bell, Millburn Street, Aberdeen.

London.—CENTRAL ELECTRICITY BOARD.—December 18th. Construction of site works, foundation works, &c., at Cardiff and Newton Abbot. (November 20th.)

OFFICE OF WORKS.—December 7th. Steel conduit tubes, switch- and plug-boxes. (November 27th.)

ISLINGTON.—January 15th. Electricity Department. Twelve months' supply of electrical stores. (See this issue.)

L.C.C.—December 14th. Installation of electric bell systems at Brook Hospital, Shooters Hill, S.E. (See this issue.)

Manchester.—December 5th. Electricity Committee. Lamp shades. (November 27th.)

December 5th.—Libraries Committee. Electric lighting installation at Wilbraham Estate library. Specification (deposit £1 1s.) from the city architect, Town Hall.

New Zealand.—January 26th. Post and Telegraph Department. 300 lamp jacks and 1,000 alarm fuses. (A.X. 11203.)*

January 27th. Telephone cords. (A.X. 11202.)*

January 28th. 100 automatic dials. (A.X. 11201.)*

Plymouth.—December 15th. Electricity Department. Steam boilers. (November 27th.)

Portsmouth.—December 9th. Electricity Department. Cables. (November 27th.)

South Africa.—RAND WATER BOARD.—January 8th. Horizontal centrifugal pump, electric motor and other electrical gear. (G.X. 10941.)* Vertical spindle centrifugal pump and electric motor. (G.X. 10942.)*

CAPE TOWN.—January 6th. Electricity Department. Capacitor equipment. (A.X. 11197.)*

Wrexham.—December 9th. Electricity Department. Electric lighting installation at 130 houses and 48 flats. (See this issue.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Brentford and Chiswick.—Sewage Committee. Accepted. Pumping plant and electrical equipment for Chiswick sewage works (£1,562).—Mirrlees Watson Co., Ltd.

Cookfield.—Parish Council. Accepted. Erection of street lights in the village.—Reid, Ferens & Co., Ltd.

Durham.—County Education Committee. Accepted. Installation of electric lighting in Howden Le Wear Council School (£98), Crook Council School (£265), and Helmington Row Council School (£145).—J. Robson.

Glasgow.—Corporation Housing Committee. Accepted. Electrical installation at housing schemes (£1,556).—R. J. McIntyre.

Corporation Education Committee. Accepted. Electric heating and lighting installation at the temporary school, Garngad Road (£366).—D. Henderson.

Grimsby.—Cleansing Committee. Recommended. Two-ton low-loading electric vehicle (£530).—Electricars, Ltd.

Hull.—Corporation Telephones Committee. Accepted. 7,000 insulators (£158).—Bullers, Ltd. Lead-in wire (£108).—Ward & Goldstone. Inside wire (£82).—Henley's. Automatic switchboard (£634) and 200 auto-desk telephones (£526).—Automatic Telephone Mfg. Co. Switchboards (£274).—Ericsson Telephones.

Foreign tenders were received quoting plus duty, and on the present rate of exchange; they were all above the quotations of British firms.

Kintore (Aberdeenshire).—Town Council. Accepted. Electrical work at Corporation housing scheme.—T. C. Smith & Co.

London.—L.C.C.—Education Committee. Electrical installation at Paddington Technical Institute:—

	£		£
Barlow Bros. & Co. ...	2,119	Electrical Installations	2,440
T. Clarke & Co., Ltd. ...	2,172	W. H. Gaze & Sons ...	2,619
H. J. Cash & Co., Ltd.	2,251	Pinching & Walton ...	2,665
Buchanan & Curwen ...	2,268	L. G. Tate & Co. ...	2,982
A. Hawkins & Sons ...	2,385	Coleby & Co.	3,400
A. Dean & Co., Ltd. ...	2,408	Smethurst & Co. ...	3,585

The Committee states that in order to reduce the cost, the lowest tenderers (Barlow Bros.) have made certain modifications and deletions in the specification resulting in a reduction of £171. This tender, reduced to £1,948, has been accepted.

Manchester.—Wythenshawe Estate Committee. Accepted. Rewiring at Sharston Hall.—E. M. Evans & Sons.

Town Hall Committee. Accepted. Electric lighting at new reference library.—Albert Sudlow & Co.

Electricity Committee. Accepted. Low voltage a.c. switchgear for twelve months.—Harland Engineering Co., Ltd. Weldless steel lamp columns and fittings for six months.—British Mannesmann Tube Co., Ltd. Busbar protective gear for Queen's Park sub-station.—Ferguson, Pailin, Ltd. Automatic voltage variation equipment for Queen's Park sub-station.—Metropolitan-Vickers.

Transport Committee. Accepted. Battery-charging plant for Queen's Road depôt.—Lancashire Dynamo Co., Ltd.

Salford.—Electricity Committee. Recommended. Static condenser equipment (£144).—Dubilier Condenser Co. Switchgear for Prestwich sub-station (£169) and for Albert Park sub-station (£160). — Metropolitan - Vickers. Transformer groups (£558).—Yorkshire Electric Transformer Co.

South Shields.—Watch Committee. Accepted.—Erection of automatic traffic signals (£677).—Chance Bros.

West Lancashire.—Rural District Committee. Accepted. Erection of overhead cables to Holmeswood, Scarisbrick, Mere Brow, and Halsall.—Henley's.

Forthcoming Events

Junior Institution of Engineers.—Friday, December 4th. Royal Society of Arts, W.C. 7.30 p.m. Inaugural meeting. Presidential address. "Some Aspects of Developments in the Generation and Transmission of Electricity: Its Influence on the Design of Plants and the Growth in the Utilisation of Electrical Power." Dr. S. L. Pearce.

Royal Society of Arts.—Monday, December 7th. Adelphi, W.C. 8 p.m. "Diesel Engines" (Lecture III). Mr. H. R. Ricardo.

Institution of Electrical Engineers.—Monday, December 7th. Institution, London, W.C. 7 p.m. Discussion on "Improving the Reliability of Domestic Electrical Equipment." Opened by Mr. C. F. Mounsdon. (*North-Eastern Students' Section.*)—Friday, December 4th. Armstrong College, Newcastle-upon-Tyne. 7.15 p.m. "Some Features and Considerations in the Layout of Power Station Electrical Equipment." Mr. T. H. Carr. (*Mersey and North Wales (Liverpool) Centre.*)—Monday, December 7th. The University, Liverpool. 7 p.m. "The Design of a Distribution System in a Rural Area." Messrs. E. W. Dickinson and H. W. Grimmitt. (*South Midland Centre.*)—Monday, December 7th. The University, Birmingham. 7 p.m. "The Electrical Heating of Buildings." Mr. R. Grierson. (*Scottish Centre.*)—Tuesday, December 8th. Institution of Engineers and Shipbuilders in Scotland. 7.30 p.m. "The Electrical Heating of Buildings." Mr. R. Grierson. (*North Midland Centre.*)—Tuesday, December 8th. Hotel Metropole, Leeds. 7 p.m. "Dielectric Phenomena at High Voltages." Messrs. B. L. Goodlet, F. S. Edwards, and F. R. Perry. (*North-Western Centre.*)—Tuesday, December 8th. Engineers' Club, Manchester. 7 p.m. "Coil Ignition Systems." Mr. E. A. Watson. (*East Midland Sub-Centre.*)—Tuesday, December 8th. Joint meeting with the Institute of Fuel at University College, Nottingham. 6.45 p.m. "Diesel Engines." Mr. E. Walter. (*Scottish Students' Section.*)—Wednesday, December 9th. Royal Technical College, Glasgow. 7.30 p.m. Discussion on "Technical Training." (*Hampshire Sub-Centre.*)—Wednesday, December 9th. Municipal College, Portsmouth. 7.30 p.m. "Progress in Electrical Measuring Instruments." Dr. C. V. Drysdale. (*Dundee Sub-Centre.*)—Thursday, December 10th. University College, Dundee. 7.30 p.m. "Porcelain Insulators." Mr. J. D. Midforth. (*Tees-Side Sub-Centre.*)—Thursday, December 10th. Cleveland Technical Institute, Middlesbrough. 7 p.m. "Electric Welding." Dr. A. F. Burstall. (*Meter and Instrument Section.*)—Friday, December 11th. Criterion Restaurant, W. 6.45 for 7 p.m. Annual dinner. (*London Students' Section.*)—Friday, December 11th. Institution, London. 7 p.m. Students' Lecture. "Oil-filled Cables." Mr. R. E. G. Horley. Saturday, December 12th. 2.30 p.m. Visit to the Holborn Automatic Telephone Exchange, High Holborn, W.C.

Electrical Power Engineers' Association (*London Local Group.*)—Tuesday, December 8th. Junior Institution of Engineers, London. 7.15 p.m. "Modern Practice in Glass Bulb Rectifiers." Mr. A. M. Browne. (*Manchester Local Group.*)—Wednesday, December 9th. Geographical Hall, Deansgate, Manchester. 7.15 p.m. "Insulating and Lubricating Oils." Mr. J. C. Jennings.

Institution of Engineers-in-Charge.—Wednesday, December 9th. St. Bride Institute, E.C. 7.30 p.m. "Recent Developments in Ignition Compression Engines." Mr. O. Wans.

Electrical Association for Women.—Thursday, December 10th. 3 p.m. Visit to the new electrical showrooms of the Sun Electrical Co., Ltd., W.C.

Diesel Engine Users' Association.—Thursday, December 10th. Caxton Hall, Westminster, S.W. 3.30 p.m. "Heavy-Oil Engines for Water Pumping Purposes." Mr. C. W. Cassé.

Edinburgh Electrical Society.—Friday, December 11th. Macvitties, Guest & Co., Ltd., Rooms, Edinburgh. 7.45 p.m. Annual whist drive and dance.

Association of Mining Electrical Engineers (Western Sub-Branch.)—Saturday, December 12th. Y.M.C.A., Swansea. "Automatic Sub-Stations." Mr. A. Rees.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the name and address of the makers of the following:—

KREFELGRIHE insulating material.

Notes

Sir Hugo Hirst on the "Crisis"

At a luncheon of the Batti-Wallahs' Society, held at the Hotel Metropole, London, on December 2nd, the chief guest was Sir Hugo Hirst, whose speech dealt with events which have led up to the present national crisis. He said that this was the outcome of fifty years of drift. When he was with the Electrical Power Storage Co., fifty years ago, the British nation was wealthy, and its wealth was not only in this country; a large part was invested in railway, tramway, and other companies abroad.

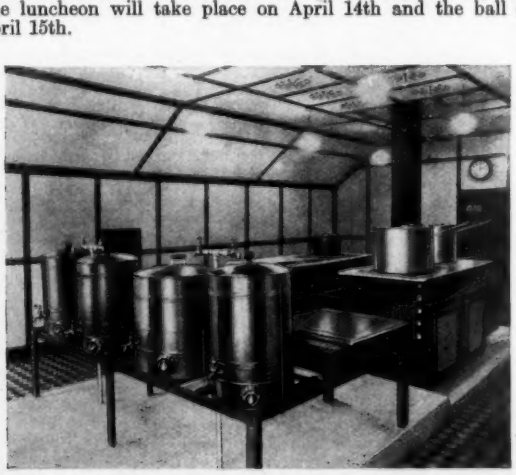
Things happened then to send us on a policy of drift. Studying industry from the electrical workshop, he found that our prosperity was not due to free trade. Other nations were at war, and much of our wealth came from the supplying of munitions. The introduction of tariffs in other countries enabled them to produce in quantities and cheaper, and our central power stations were museums of Continental productions. The danger was realised by such leading men in the electrical industry as Mr. Byng, Dr. Ferranti, and others, who formed a protection league. The borrowing of millions of money in this country by the A.E.G. at 3 per cent. for Argentine development, from which the company made 15 per cent. profit, and the construction of our tubes with American capital led to the appointment in 1904 of the Tariff Commission. Even after the War we were still wealthy, but the policy of drift continued.

The remedy for our present situation was protection. If foreign countries saw that we were intent on protection, money would come into the country. Protection would enable us to go in for mass production and restore our national efficiency. We were all free-traders at heart, but only on equal terms.

Electricity would improve the processes of manufacture in every industry. The grid was nearly complete, and would reduce the cost price of power in industry. He was satisfied that if we obtained protection the value of the pound would rise.

E.A.W. Annual Conference, 1932

The next annual conference of the Electrical Association for Women will be held in London on April 14th and 15th, 1932. The luncheon will take place on April 14th and the ball on April 15th.



All-electric canteen at the Grampian hydro-electric works
(*See p.* 837)

Rural Supplies in the N.W. Midlands

On November 24th a rural distribution scheme covering about one hundred sq. miles in Eccleshall and district was completed. An 11-kV ring main links up Eccleshall, Norton Bridge, Great Bridgeford, Sleighford, Haughton, Gnosall, Workseaves, and High Offley, continuing to Eccleshall with spurs to Chersey and Norbury. The whole scheme was carried out by Overhead, Ltd., for the North-West Midlands

At the inauguration of the Eccleshall scheme

Front Row: Mrs. Leese, Alderman Leese, chairman of the Joint Electricity Authority, Mrs. Yeaman, Rev. Smith, Mr. Adey, Mrs. Clark.

Back Row: Mr. Dobbs, Mr. Loveridge, Mr. Yeaman, chairman of the Engineers' Committee, Mrs. Dobbs, Mrs. Gardner, Mr. Gardner, Mr. Guerney, Mr. Clark.

Joint Electricity Authority, and the contract included, in addition to the construction of the overhead lines, the obtaining of wayleaves, canvassing of consumers, wiring of houses, and everything else necessary for handing over the scheme in operation. The proceedings started with a luncheon party held at the Royal Oak Hotel, Eccleshall. Mr. C. W. Loveridge (manager, Overhead, Ltd.) was in the chair, and Mr. and Mrs. Yeaman were amongst those present. In responding to the toast to "The Success of the N.W.M.J.E.A.," Alderman Leese congratulated the contractors on having obtained some four hundred consumers before the supply had been switched on. He knew of no other electrical firm which had carried out a similar complete scheme. After the luncheon the party crossed the road to the all-electric house, which was declared open by Alderman Leese.

Electricity in Grinding-wheel Manufacture

The Norton Grinding Wheel Company, Ltd., started up its works at Welwyn Garden City, Herts., on August 1st, and a company of engineers and others interested in its products inspected the premises on November 26th. Abrasive grains (mainly of silicon carbide or alumina oxide) are imported from Worcester, Mass., and are a result of low-priced electricity for furnace work. At Welwyn they are bonded with clay and felspar by a puddling process, and after drying the friable wheels are shaved and punched into the requisite shapes.

The wheels are then heated in kilns to 1,265 deg. C. in a heat cycle that lasts from one to three weeks, and finished by machinery with manganese steel tools. Every wheel of over 5 in. dia. is tested at 150 per cent. of normal speed. The capacity of the plant is about seven tons of wheels per day. There are at present 130 men on the pay-roll.

Electricity is supplied by the Welwyn Garden City Electricity Supply Co. The electrical installation comprises 92 a.c. motors and 32 d.c. motors with aggregate capacities of 783 and 96 h.p., respectively. There is also a battery of six baking ovens which develop a temperature of 500 deg. F. with a rated capacity of 300 kW. Some 16,000 kWh is consumed per week with a maximum demand of 330 kW. The load factor is expected to reach 51 per cent. in the early future. Grit-excluding bearings of a new type are in use on the B.T.-H. motors. Incidentally, the Welwyn Supply Co. has now 2,406 consumers, of whom 1,153 cook by electricity.

Messrs. Alfred Herbert, Ltd., remain the sole selling agents for the Norton Co. in Great Britain.

A cinema film of the manufacture of grinding wheels was shown, and a luncheon followed at which Mr. F. A. Emery (general manager) presided. Speeches bearing on the products of the Norton Co. were made by Sir Herbert Austin, K.B.E., Sir Theodore Chambers, K.B.E., Sir Alfred Herbert, K.B.E., and Mr. F. H. Horton.

Appointments Vacant

Accountant for the North-West Midlands Joint Electricity Authority.

Lady showroom attendant and cooking demonstrator for Ipswich Electricity Department.

Mains superintendent and sales engineer for the Electricity Board of Northern Ireland.

(See the advertisement pages of this issue.)

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. H. G. Crawford, assistant in the Engineering Department of the Great Northern Railway of Ireland, has been appointed permanent way engineer by the Belfast Corporation Tramways Committee. The position was rendered vacant by the appointment of Major R. McCreary to the post of general manager and engineer of the undertaking.

Capt. J. M. Donaldson, the President of the Institution of Electrical Engineers, attended a dinner organised by the Société Française des Electriciens on November 26th and presented the president of that body with a specially-bound copy of the Faraday Centenary number of the "I.E.E. Journal."

Mr. F. W. Clements has been appointed chairman of the State Electricity Commission of Victoria, in succession to the late Sir John Monash. The appointment is for three years, at an annual salary of £2,100, subject to the percentage reduction under the Financial Emergency Act, which reduces the salary to about £1,600 a year. Mr. Clements has been acting chairman since the death of Sir John Monash, and is described by Mr. Hogan, the State Premier, as "probably the greatest electrical engineer in Australia." He is a native of Halstead, Essex. In 1881 he joined the Brush Electrical Engineering Co., Ltd., and supervised important contracts in England and on the Continent. Later he was with the County of London Electric Supply Co. In 1900 he went to Australia and joined the staff of the Melbourne Electric Supply Co., Ltd. He became chief engineer and managing director and held that position until last year, when the company was taken over by the State Electricity Commission. There are three part-time Commissioners, Mr. Clements having been one since 1926, the other two being Sir Thomas Lyle and Sir Robert Gibson.

Mr. F. W. Clements, the new Chairman of the Victorian Electricity Commission

Mr. J. Fox Heath, M.I.E.E., M.I.M.E., has commenced practice as a civil and electrical engineer, specialising in electric traction, overhead transmission and industrial electrification. His addresses are: "Lindsay Grange," Oaken, near Wolverhampton, and 114, Hampton Road, Forest Gate, E.7.

Mr. H. W. Bosworth, joint managing director of the Lancashire Dynamo & Motor Co., Ltd., and of the Crypto Electrical Co., has arrived in South Africa. During his stay he will visit various centres of the Union and Northern Rhodesia.

Mr. A. R. Burton, deputy general manager to the West Hartlepool Corporation Transport Department, has been appointed transport manager.

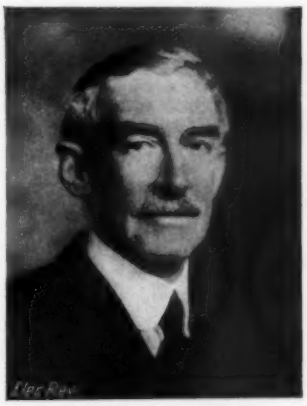
Obituary

Mr. W. Lee Mathews.—We learn with regret that Mr. William Lee Mathews, who was for many years well known in electrical circles as the London director of Messrs. Thomas Bolton & Sons, Ltd., passed away on Monday last at Fuon Santa, Gairaut, Nice, in his seventy-first year.

Flight-Lieut. E. V. S. Lacey.—We desire to express on our own behalf, as well as for many friends in the electrical profession, deep sympathy with Mr. E. M. Lacey, M.Inst.C.E., M.I.E.E., consulting engineer, of 12, Victoria Street, S.W., on the death of his son, Flight.-Lieut. E. V. S. Lacey. Flight-Lieut. Lacey, who was thirty-one years of age, was killed in a collision in the air at R.A.F. Headquarters, Kenley, Surrey, on November 24th.

Mr. P. F. Allan.—We regret to learn of the death, on November 30th, of Mr. P. F. Allan, engineer and works manager of the Liverpool factory of British Insulated Cables, Ltd.

Mr. A. H. Darker.—Mr. Darker (whose death was reported in our last issue) was born in Queensland, Australia, in 1872. His early engineering training included a period in the drawing office and works of the Queensland Government Railways, of which his father was subsequently chief mechanical engineer; thence he came to England and was a pupil under Mr. (now Sir Henry) Fowler of the Midland Railway, and he studied electrical engineering at Finsbury Technical College under Professor Silvanus Thompson. From the Midland Railway he entered the employ of J. Stone & Co., Ltd., in their electrical department, rising to the position of chief electrical engineer. He was an associate member of the Institutions of Electrical and Mechanical Engineers, a member of the Association of Railway Electrical Engineers of America, and of the Royal Geographical Society. He was instrumental in furthering and considerably widening the field of application of electric lighting installations for railway carriages of which his principals were manufacturers. In their interests he visited many of the important railway centres in practically all parts of the world, including the South American republics, Canada, the United States, India, Australia, New Zealand, and many European countries. In the applications of electricity to railway passenger stock he introduced or developed a number of new features and improvements, including a railway carriage ventilation system, electrical heating equipment with automatic temperature control for banana vans, and water supply services in railway carriages. It was largely due to his initiative that the system of electric lighting and fans used on the ambulance trains in France during the War was adopted.



The late Mr. A. H. Darker

Mr. E. Garton.—We regret to announce the death of Mr. Edward Garton on November 23rd at Leamington Spa. Mr. Garton, who had been in indifferent health for several years, was fifty-five years of age, and was sales manager at the Coventry works of the British Thomson-Houston Co., Ltd. Born in London he was educated at Montrose College, Brixton Hill; he commenced his apprenticeship with Seager Bros., Dartford, and took up his studies in electrical and mechanical engineering at the Royal Polytechnic and King's College. In 1897 he joined the B.T.H. Co., but three years later he entered the service of the American General Electric Co. After his return from America in 1902 he rejoined the B.T.H. Co., taking up a position in the Sales Department at Rugby, and he was appointed in 1912 to the position which he held at the time of his death. Mr. Garton was chairman of the British Ignition Association, Ltd.

The late Mr. E. Garton

Major H. Clifford Palmer.—We regret to record the death of Major H. Clifford Palmer after many years' illness. He passed away on November 24th at the age of forty-eight years. Practically the whole of his business life was spent in the service of the General Electric Co., Ltd., where he was manager of the Publicity Department until ill-health caused him to relinquish the post. Major Palmer joined the G.E.C. in 1903 when electrical publicity was conducted upon far less pretentious lines than is the case to-day. He laid the foundations of the present publicity organisation of the G.E.C. at a time when nobody could have foreseen what its ultimate growth would be. He saw considerable service during the War. Always a keen Territorial, he was mobilised with the London Scottish at the outbreak of the War and proceeded to France with them. He was later transferred to the Loyal North Lancashire Regiment, and served in Egypt, India and Mesopotamia. He was twice wounded and was mentioned in despatches. He was well known in the advertising world, and keen regret at his death is felt by his former G.E.C. colleagues. He leaves a wife and three children. The funeral took place at Carshalton on Saturday last.

The late Major H. Clifford Palmer

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Zetavox Radio & Television, Ltd.—Private company. Registered November 27th. Capital, £10,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in radio, television, telephone and telegraph apparatus, mechanical or electrical instruments for recording or reproducing sound, etc. The directors are: P. Klugh, 5555, Everett Avenue, Chicago; C. E. Marshall, address not stated (appointed by Zenith Radio Corporation); and M. Sobel, 17, Lordship Park, N.16 (appointed by Kenneth Brooks (Radio & Television, Ltd.)). So long as Zenith Radio Corporation holds 30 per cent. of the issued share capital they may appoint two directors and so long as Kenneth Brook (Radio & Television), Ltd., hold 30 per cent. of the issued share capital they may appoint one director. No qualification required. Solicitors: Blundell Baker & Co., 16, Serjeants Inn, E.C.4.

Arnold Goodwin, Ltd.—Private company. Registered November 25th. Capital, £1,200 in £1 shares. Objects: To adopt an agreement between Arnold Goodwin & Son, Ltd., and its liquidator of the first part, A. Goodwin, A. Goodwin, jun., Ida Goodwin, and S. J. Crisp of the second part, and this company of the third part, to develop and turn to account the business referred to therein, and to carry on the business of manufacturers and repairers of machines, electrical, steam, hydraulic, and other engineering appliances, etc. The directors are: A. Goodwin, jun., 101, Kingston Hill, Surrey, and S. J. Crisp, 36, Church Avenue, Beckenham. Registered office: 56, Sumner Street, Southwark, S.E.1.

Wilson's Electric Greyhound Racing, Ltd.—Private company. Registered November 27th. Capital, £3,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electric hare equipment and apparatus and other appliances used in connection with greyhound racing, etc. The permanent directors are: W. Wilson (chairman), 57, Peckham Rye, S.E.15; W. Lennards, 175, Railway Approach, Shepherd's Bush, W.12; R. J. Clasper, 56, Boscawen Street, Deptford, S.E.8; B. S. Gelston, 6, Dashwood Road, Gravesend; and C. J. Cullen, 302, Holloway Road, N.7. Secretary: C. J. Cullen. Registered office: 57, Peckham Rye, S.E.15.

W. Monks & Co., Ltd.—Private company. Registered November 25th. Capital, £1,500 in £1 shares. Objects: To acquire the business carried on by W. Monks as "W. Monks & Co.," at 2, Mayes Street, Manchester, and to carry on the business of electricians, radio and electrical engineers, contractors, wire makers, cabinet makers, etc. The permanent managing directors are: W. Monks, 3, Collison Avenue, Chorley, electrical factor, and J. F. Young, 7, Hilton Road, Higher Poynton, Cheshire, electrical engineer. Solicitor: C. B. Hudson, Church Lane, Rochdale.

Garmiles, Ltd.—Private company. Registered November 27th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of gramophones, wireless apparatus, electric batteries, valves, etc. The directors are: P. R. Garner, Barton Cottage, Blackroot Road, Sutton Coldfield (chairman), and S. H. Miles, 90, Lee Bank Road, Edgbaston, Birmingham. Registered office: 18, Aston Street, Birmingham.

Cheadle Electric & Radio Co., Ltd.—Private company. Registered November 27th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of, agents for and dealers in electrical and wireless apparatus, etc. The directors are: A. G. Sarson, Fairways, Cheadle, Staffs; G. R. Ward, Greenhill View, Cheadle, and T. H. Campbell, "Homelyn," Harewood Road, Cheadle. Secretary: G. R. Ward.

Hunter Radio, Ltd.—Private company. Registered November 23rd. Capital, £500 in £1 shares. Objects: To carry on the business of radio engineers, dealers in radio components and sets, electrical fittings, etc. The directors are: C. H. Bennett, 17, Ranelagh Gardens, Ilford; K. P. Hunt, 55, Norton Road, Wembley, and F. Tickner, 57, Green Lane, New Malden. Registered office: 1, York Avenue, Browning Street, S.E.17.

Ero Condenser Co., Ltd.—Private company. Registered November 26th. Capital, £200 in £1 shares. Objects: To carry on business as manufacturers of radio components and apparatus, electrical and scientific instruments, etc. The subscribers are: W. M. Hewett and E. Roederstein, both of 35a, Claybrook Road, W.6. Secretary: W. M. Hewett.

Returns of Electrical Companies

A. E. Morrison & Sons, Ltd.—Deposit on November 5th of deeds of freehold land and premises in Gartree Street, Leicester, to secure all moneys and liabilities incurred by the mortgagors after October 23rd, 1931, upon any account or in any manner whatsoever. Holders: United Dominions Trust (Electric), Ltd., King's House, King Street, E.C.2.

Collectron, Ltd.—Particulars filed of debentures for sums not exceeding £2,000, authorised by resolutions of October 24th and November 5th, 1931, charged on the company's undertaking and property, present and future, including uncalled and unpaid capital (if any), the amount of the present issued being £1,000.

Vortexion, Ltd.—J. W. M. Groves, Leith House, 47, Gresham Street, E.C.2, who was appointed receiver and manager, on November 16th, 1931, under powers contained in mortgage debenture dated March 13th, 1931, ceased to act in those capacities on November 19th.

F. J. Ashton, Ltd.—P. Phillips, 118/122, Great Portland Street, W.1, was appointed receiver and manager on November 19th under powers contained in debenture dated April 13th, 1931.

Litholite Insulators, Ltd.—Deposit on November 17th, 1931, of deeds of 55, Hackney Grove, E.8, to secure all moneys due or to become due from the company to Barclays Bank Ltd.

Griffin, Harding & Bryant, Ltd.—Capital £3,500 in 2,000 preference, 1,400 ordinary, and 100 founders' shares of £1. Return dated September 9th, 1931. 1,184 preference, 1,400 ordinary, and 100 founders' shares taken up. £1,384 paid on the preference and 200 ordinary shares. £1,300 considered as paid on 1,200 ordinary and 100 founders' shares. Mortgages and charges, nil.

Philip Kay, Ltd.—Particulars filed of £1,000 debentures, authorised November 11th, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Frank Raworth, Ltd.—Capital £3,000 in £1 shares. Return dated July 31st, 1931. 2,222 shares taken up. £2,022 paid. £200 considered as paid. Mortgages and charges, nil.

Vaughan Crane Co., Ltd.—Capital £150,000 in 50,000 preference and 100,000 ordinary shares of £1. Return dated September 9th, 1931. 16,880 preference and 53,578 ordinary shares taken up. £43,669 paid. £26,789 considered as paid. Mortgages and charges, nil.

Coventry Electrical Appliances, Ltd.—Capital £10,000 in £1 shares. Return dated September 29th, 1931. 5,187 shares taken up. £5,137 paid. £50 considered as paid. Mortgages and charges, nil.

Mansbridge Condenser Co., Ltd.—Capital £25,000 in £1 shares. Return dated August 11th, 1931. All shares taken up. £10,000 paid. £15,000 considered as paid. Mortgages and charges, nil.

C. B. Jackson & Co., Ltd.—Capital £3,000 in 1,000 preference and 2,000 ordinary shares of £1 each. Return dated September 3rd, 1931. 970 preference and 1,813 ordinary shares taken up. £1,083 paid. £1,700 considered as paid. Mortgages and charges, nil.

City Notes

Associated Electrical Industries, Ltd., sent to the ordinary shareholders on November 25th particulars of an offer to them of an issue of a further 1,399,560 ordinary shares of £1 each at £1 1s. per share. Applications have to be in by December 10th. Each holder is entitled to two ordinary shares for each five already held; he can also apply for additional shares if he desires. The preference shareholders can apply for any shares not taken up by the ordinary shareholders, but without any guarantee of allotment. The taking up of any shares not applied for is guaranteed by Vickers, Ltd., and International General Electric Co., Inc., two of the largest shareholders, but no commission is being paid. The purpose of the issue is to carry into effect a decision of the board (November 1st, 1931) to redeem the £1,396,390 seven per cent. mortgage debenture stock of the British Thomson-Houston Co., Ltd., and to provide the finance required for that purpose. The middle market price of the shares on the Stock Exchange was 23s. 9d. on November 24th. The prospectus setting forth the offer contains particulars of the financial position of the company and the profits of the several associated companies. With regard to future prospects, it is stated that although due to world conditions, the volume of orders in 1931 shows a falling off compared with 1930 the board is hopeful that with more settled political conditions a revival of trade may be anticipated, and subject to certain losses on exchange, for which the company has reserves, the profits for the current year are estimated to be substantially the same as in 1930. Material reductions in overhead expenses have been effected, and the board has confidence in the company's future. The work of co-ordinating the activities of the companies of the group, without interfering with the separate identity and individuality of each company, is proceeding, and good progress is reported in co-operation, particularly with respect to engineering, production, research, accounting, and purchasing. The present financial measure is expected to facilitate further co-ordination of interests. The following is a list of the Associated Companies:—Metropolitan-Vickers Electrical Co., Ltd.; British Thomson-Houston Co., Ltd.; Edison Swan Electric Co., Ltd.; Ferguson, Pailin, Ltd.; Birtley Co., Ltd.; Cosmos Lamp Works, Ltd.; Edison Swan Cables, Ltd.; Electrical Manufacturers' Finance Co., Ltd.; Harcourts, Ltd.; Hotpoint Electric Appliance Co., Ltd.; Park Royal Engineering Co., Ltd.; Associated Electrical Industries (India), Ltd.; and the Australian Electrical Manufacturing Co., Ltd.

The Galloway Water Power Co. was before the public last week, when Lazard Bros. & Co., Ltd., offered £1,400,000 5 per cent. redeemable debenture stock (1947-91) at 93 per cent. The list opened on November 26th and it was announced later that the underwriters had had to take up about 90 per cent. of the issue. The prospectus contained a lengthy letter from Lord Meston, the chairman, explaining the scheme of the company, which was incorporated under the Galloway Water Power Act, 1929. It is proposed to construct and work generating stations at Tongland, Glenlee, Kendoon, Carsfad and Earlstoun, in order to utilise certain water power available in the district of Galloway in the south-west of Scotland and estimated to produce 140,000 h.p. Under the South Scotland Electricity Scheme, 1931, these stations are scheduled as "selected stations." As a result of this, the whole output of the company will be purchased by the Central Electricity Board. The company will receive during a period not exceeding ten years grants in respect of interest from H.M. Treasury under Part I of the Development (Loan Guarantees and Grants) Act, 1929. Under an agreement dated October 29th, 1931, between the Central Board and the company, the Board has covenanted to pay to the company, in each year from a date not later than August 1st, 1936, so long as any part of the present issue is outstanding, a sum which will be sufficient, after meeting the operating charges of the stations, to cover the interest and sinking fund payments in respect of the present issue of stock. Such payments by the Board will

be reduced by the amounts to be received by the company by way of grants from H.M. Treasury. Until August 1st, 1936, or such earlier date as the works may be completed, interest will be met in part out of the grants to be received by the company from H.M. Treasury, and in part out of capital. The stock offered will provide funds for the construction of the first part of the works required in connection with the selected stations and for general purposes. Construction of the works has recently been commenced, and the works will be completed not later than August, 1936. The company has power under its Act to purchase electricity from the Central Board for the purpose of supplying consumers in the county of Kirkcudbright, but no part of the proceeds of this issue of stock will be spent on the supply of electricity otherwise than to the Central Board. The following are the directors of the company:—Lord Meston (chairman), Hon. Robt. Brand, Major A. L. Chandler, Norbert Merz, and Robert Nelson. Sir Alex. Gibb & Partners and Merz & McLellan are the consulting engineers, and the offices are at Queen's House, Kingsway, W.C.2.

E. K. Cole, Ltd., manufacturers of all-electric radio sets, published a prospectus on Wednesday last offering for subscription 140,000 7 per cent. redeemable cumulative preference shares of £1 each and 140,000 ordinary shares of 5s. each at par. The company has a capital of £400,000, of which £348,672 is in issue. A statement published in the prospectus showed that the net profit for the ten months ended January 31st, 1929, was £12,070; in the next year it amounted to £40,508; and in the year ended January 31st last to £114,498. The corresponding dividends on the ordinary shares were 7, 32 and 100 per cent. respectively. The proceeds of the issue, applications for which were to be sent in by to-morrow (Saturday), are to be devoted to financing the extension of the company's works and to provide further working capital.

The Anglo-Argentine Tramways Co., Ltd., submitted to a meeting of holders of the 5 per cent. debenture stock, on November 30th, a resolution sanctioning a scheme of arrangement. The Duke of Atholl (chairman), who presided, said that the Argentine Minister of the Interior had ordered the commission appointed to examine the company's petition for a betterment of the operating conditions necessary to place its financial situation on a sound footing, to submit its report by mid-December. The Minister considered that as a result of this report the Government would be able to settle favourably the company's demands. As a quorum was not present the meeting was adjourned until December 15th.

Electric & Musical Industries, Ltd., reports that the combined net profits of the merged companies, the Gramophone Co. and the Columbia Graphophone Co., for the year ended June 30th last amounted to £160,893, as compared with £1,422,090 in the preceding year. Full provision has been made for depreciation in the past year and £200,000 was set aside for rebates on stocks of dealers and to cover the fall in the value of raw materials. An interim dividend of 3s. per share has been paid by both companies and no further dividend is recommended for the year.

S. Smith & Sons (Motor Accessories), Ltd., report a profit of £77,179 for the year ended August 1st, as compared with £140,183 in the preceding year, to which is added £42,598 brought in, making £119,777 available. After providing for depreciation and taxation, etc., a dividend of 7 per cent. is paid on the preferred ordinary shares (against 12½ per cent.), but no dividend is paid on the deferred ordinary shares (against 18¾ per cent.). The balance carried forward is £44,329.

Companies Struck Off the Register.—The names of the undermentioned companies have been struck off the Register and they are thereby dissolved:—

Asgood Accumulator Co., Ltd.
Excel Wireless Components, Ltd.
London Wholesale Electrical Supplies Co., Ltd.
Radio Corporation of Portugal, Ltd.
Northern Electric Supplies Co., Ltd.
Teleswitch, Ltd.

The Ceara Tramway, Light & Power Co. reports an increase in gross receipts for the year ended June 30th, but increased expenditure and loss in exchange resulted in a decrease in the net revenue from £29,876 to £15,509. After deducting debenture interest and sinking fund charges and placing £3,000 to reserve, a balance of £9,543 is carried forward, against £9,216 in 1929-30.

The Bengal Telephone Corporation reports a net profit for the year ended June 30th of Rs. 5,94,846, a decrease of Rs. 1,08,340. A dividend of 6 per cent. is paid on the ordinary shares and Rs. 76,904 (Rs. 59,486) is carried forward.

Petters, Ltd., announce that in view of prevailing conditions the directors have decided to defer consideration of the payment of an interim dividend on the preference shares for three months.

The British Columbia Power Corporation has announced the usual quarterly dividend of 50 cents per share on the class "A" shares of no par value.

The Broughton Copper Co., Ltd., states that there was a loss on the working for the half-year ended September 30th, and no dividend is recommended on the preference or ordinary shares.

The Globe Telegraph & Trust Co., Ltd., has announced that the income is insufficient to pay an interim dividend on the ordinary shares in respect of the second quarter of the financial year. No dividend was paid for the first quarter.

The Burma Electric Supply Co., Ltd., reports a net profit for the year ended July 31st of £12,034, as against £13,836 in the preceding year. It is proposed to pay an ordinary dividend of 4 per cent. (against 5 per cent.) and to carry forward £7,917 (£7,883). Meeting: December 9th.

Agar, Cross & Co., the South American engineering trading firm, state that in view of the loss on the trading for the year ended June 30th, no dividend will be paid on the ordinary shares (against 11 per cent., tax free, for 1929-30).

The Radio Corporation of America reports a gross income for the nine months to September 30th of $73,638,019, as compared with $85,150,256 in the corresponding period of 1930. The net income was $3,957,489 ($870,753). The earnings exceeded preferred dividend requirements by $52,980. In the third quarter the Corporation earned $17,635 in excess of preferred dividend requirements, as compared with a deficit of $935,845 a year ago, after meeting preferred dividends.

The Electric Construction Co., Ltd., has deferred consideration of payment of an interim dividend on the 7 per cent. cumulative preference shares until after the close of the financial year on March 31st next.

The American Telephone & Telegraph Co. has announced its regular quarterly dividend of $2.25 per share.

The Brazilian Traction, Light & Power Co. has announced an interim dividend of 1¼ per cent. on the preference shares.

The Shropshire, Worcestershire & Staffordshire Electric Power Co. has announced an interim dividend of 4 per cent. (same) on the "A" ordinary shares.

Stocks and Shares

TUESDAY EVENING.

PRICES of stocks and shares in nearly all the markets of the Stock Exchange have continued their downward trend during the week under review. The buying power became perceptibly weaker, while selling from the provinces and abroad has been very noticeable. The catalogue of financial and political problems is too well known for it to require repetition. It is of sufficient consequence to check the investor in taking any but the shortest of views. Until it is possible to foresee with greater clarity the future trend of events, Stock Exchange members are inclined to agree that there is no great prospect of market recovery, at all events during the present month. In the general welter of weakness it is a cause of satisfaction to find that shares in the Home electricity companies maintain their ground with a fair degree of firmness. The slump in the value of the £ sterling has produced little variation in the prices of the supply companies' issues.

New Issues

That confidence is dormant rather than dead is evidenced by the result attendant upon a number of new issues connected with electricity supply and power recently offered to the public. Quite lately, the Central Electricity Board has placed privately three separate amounts of a million pounds each in 5 per cent. stock at 94½, 95½ and 97½. This stock is now quoted at 99. The Midland Counties offer of 300,000 new ordinary shares to the company's own proprietors at 24s. was promptly accepted, and the new shares are quoted at 1s. 9d. premium. Associated Electrical Industries has been making an issue to its shareholders of new shares at a guinea each. These stood, when they first came to market, at a premium of about 9d., but selling of the old shares in order, apparently, to take up the new issue, reduced the price of the former to 20s. 9d., and, accordingly, the premium vanished from the new shares. The Galloway Water Power Company offered £1,400,000 in 5 per cent. redeemable debentures at 93. In this case, the public response proved meagre, and the underwriters had to take up a very substantial proportion of the total. The scrip is quoted at 1½ discount. New preference and ordinary shares in Ekco were announced as coming for public subscription this week.

Gilt-edged Stocks

Gilt-edged stocks as a whole remain firm. The newly offered London General Omnibus 5 per cent. income debenture stock, the first buyers of which were able to get in at 92½, has risen to 93, at which the return on the money is 5¾ per cent. An attraction about the stock is that it can be bought at present without paying stamp and fee. There is on offer £10,000 London Power 5 per cent. redeemable debenture stock at 98, giving £5 2s. per cent. on the money, and £2,500 South London Electric Supply 4½ per cent. debenture stock at 93, with June and December interest, yielding £4 16s. 9d. per cent. This last-named stock looks expensive under existing monetary conditions, although the security is, of course, first-class. An oddment of £300 Bournemouth & Poole 4½ per cent. debenture stock is available at 95, giving £4 14s. 9d. per cent. To meet the £6,539 required for the annual interest service of the stock, there was, in last year's accounts, £162,000 available. Redemption can take place at any time at 107.

Home Electricity Supply Shares

A few falls in the Home Electricity Supply list include shares of the London and of the provincial companies. County of London, Charing Cross, Electric Supply Corporation and Metropolitans show small losses. Clyde Valleys, Yorkshires, Bournemouths and Newcastle-on-Tynes have also drooped to a slight extent. Business in this market is very quiet.

Cables and Wireless

Cables & Wireless stocks have fallen heavily by reason of the disappointment felt with the last traffic return. This brought out stock from holders who had bought perhaps more than they intended to keep for permanent investment. The heaviness in the market was intensified by the passing by the Globe Telegraph & Trust of its dividend on the ordinary shares for the second quarter of the financial year that ends next May. In the previous financial year, the Globe Telegraph & Trust paid two quarterly dividends of 2½ per cent. each, and two of 1½ per cent. each, making 8½ per cent. in all, which compared with 10 per cent. free of tax for many years previously. The ordinary shares have gone back a further 20s. to 9, bringing

them into line with the preference. Great Northerns at 22½, and Marconi Marines at 35s., are both lower. American Telephone & Telegraph at 195 is 17½ higher on the week. The company has declared its usual quarterly dividend of 2¼ per cent. Internationals have rallied to 18, after touching 15½. The president of one of the American telephone companies has been advocating, as a means for alleviating the present trade depression, a campaign for intensive selling of telephones. His reason is, briefly, that extension of telephony would represent a real economy in time, labour and other directions.

Home Railway Stocks

Metropolitan consolidated has dipped to 39½, and Underground Electric ordinary to 19s. The Prime Minister stated the other night in the House of Commons, with regard to the London Passenger Transport Bill, that he was unable to announce any decision in regard to the Government's intentions until certain discussions proceeding in connection with the Bill were completed. The London, Midland & Scottish has in operation an important scheme for increasing the electric suburban service between Watford and Broad Street and Watford and Euston. The General Electric Company has been given an order for a generating set for use at the London, Midland & Scottish Railway's Stonebridge Park power house. The contract includes a 20,000-kW turbo-alternator. The work is to proceed immediately, and delivery is to be completed by the autumn of next year.

Manufacturing and Equipment

The various financial and political influences in other directions have made their depressing effect felt upon the market for shares in the companies that deal with the manufacturing and equipment side of the electrical industry. No such boomlet occurred as was expected by previous purchasers who had acquired their shares thinking that the introduction of an Anti-Dumping Bill by the National Government would have an immediately inspiring effect upon industry and upon Stock Exchange prices. While there is no doubt entertained as to the increase in trade which is being enjoyed in many branches as compared with the profound depression experienced during the middle part of the year, the extreme caution shown by investment holds out no immediate hope of activity in the markets for industrial shares. For this reason, a number of falls are shown, Brush ordinary, for example, going back 5 to 70, Callenders to 2¾, Henleys to 5¾. British Aluminium have shed another half-crown, leaving the price 26s. 3d., and Enfields are 3/16 down at 4-1/16. General Electrics dropped to 40s. 9d., Associated Electrical Industries ordinary, for the reasons given above, are 3s. down. Amongst lower-priced shares, Electric Constructions have lost part of their recent brightness, the price reacting to 10s.

Siemens and Halske

Nothing fresh in the way of news or of price-change has transpired in regard to Telegraph Construction. Siemens remain at 23s. 3d. The German company, Siemens & Halske, held a general meeting of the supervisory board at the end of last week, when it was stated that the downward tendency in sales had not yet abated. Although no forecast could be made of the year's results, the board anticipated that Siemens and Halske would be in a position to distribute a dividend, probably much reduced from the 14 per cent. paid last year.

Miscellaneous Movements

Brazilian Tractions at 14¼ are a little better on the week, and Rio Tramway Firsts at 107½ show a gain of 5 points. American industrials ought to be decidedly better, judging by the movements in the rate of exchange, but no particular variations have occurred apart from the rises in American Telephone. Power Corporation of Canada at 37½ are 1½ lower, and Shawinigan at 36 has gone back ½. New York Telephone 4½ per cent. bonds, on the other hand, rose several points to 135. The Anglo-Argentine Tramways Company held a meeting on Monday in this week to consider a resolution sanctioning a scheme of arrangement. As a quorum was not present, the meeting was adjourned until December 15th. Amongst movements of miscellaneous issues, Lisbon Electric Tramway ordinary shares at 17 are lower, and Manx Electric Railway 4½ per cent. first debenture at 45 has shed 10 points. Atlas ordinary receded to 11s. 3d. Babcock & Wilcox have weakened, in company with other iron and steel shares, and Vickers fell to 8s. before recovering to 8s. 6d. No changes of consequence have occurred in the rubber share market.

New E.A.W. Branch at Harrogate

A Harrogate and District branch of the Electrical Association for Women was formed on November 26th at a meeting over which Mrs. W. H. Thompson presided. The gathering was addressed by Miss Haslett, director of the Association, and Mr. W. B. Woodhouse, general manager of the Yorkshire Electric Power Co. Those present included the Mayor and Mayoress of Harrogate, Mrs. W. B. Woodhouse, Mr. H. Bolland (chairman, Harrogate Electricity Committee), and Mr. Neil MacLean (borough electrical engineer, Harrogate). A council was appointed, with Mrs. Thompson as chairman, Mrs. Bottomley as treasurer, and Mrs. A. Turner as hon. secretary.

Northern Ireland's Board's Headquarters

The Electricity Board of Northern Ireland has opened its headquarters at 27, Great Victoria Street, Belfast.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1929.	1930.	Price, Dec. 1, 1931.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES						
Bournemouth and Poole		15	15	57/6	−½	5 4 4
Brompton Ordinary		8½	8½	27/6	—	5 1 0
Central Electricity 4½% Deb.	Stock	—	4½	89	—	5 1 3
Charing Cross Ordinary	1	8½	8½	29/-	−6d.	4 16 7
Chelsea	1	8½	8½	26/-	—	5 7 8
City of London	1	10	10	35/-	—	5 14 3
Clyde Valley	1	8	8	31/3	−½	5 2 5
County of London	1	11	11	43/9	−½	5 0 7
Edmundsons' 7% Pref.	1	7	7	24/6	—	5 14 3
Elec. Supply Corporation	1	11	11	41/3	−½	5 6 6
Kensington Ordinary	1	8	8	29/-	—	4 16 7
Lancs. Light and Power	1	7	6½	25/-	—	5 4 0
London & Home Counties 4½% Deb.	Stock	—	—	89	—	5 1 3
London Electric	1	8½	9	32/6	—	5 10 9
Metropolitan	1	9	10	38/9	−2/-	5 3 3
Midland Counties	1	6½	7	27/0	—	5 3 8
Mid. Elec. Power	1	15	8	29/6	—	5 8 6
Newcastle-on-Tyne Ordinary	1	6	6	23/9	−9d.	5 1 1
Do. 7% Pref.	1	7	7	26/-	—	5 7 8
Notting Hill 6% Pref.	10	6	6	10½	—	5 14 3
North Met. Elec. 6% Pref.	1	6	6	22/6	—	5 6 8
St. James' and Pall Mall	1	8	8	29/-	—	4 16 7
Scottish Power	1	8	8	28/3	—	5 13 3
South London	1	8½	8½	25/6	—	5 9 3
Urban Ordinary	1	7	7	27/-	—	5 3 3
Westminster Ordinary	1	8½	8½	28/-	—	5 0 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	23/-	—	6 10 5
Yorkshire Elec.	1	8	8	32/-	−6d.	5 0 0
HOME RAILS						
Central London Ord. Assented	Stock	4	4	70½	—	5 13 6
Metropolitan	,,	4	3½	39½	−3	8 16 0
Do. District	,,	5	5	61½	—	8 2 3
Underground Electric	1	8	8	19/-	−1/-	8 8 6
TELEGRAPHS AND TELEPHONES						
Anglo-Am. Tel. Pref.	Stock	6	6	95	−1	6 6 4
Do. Def.	,,	1½	1½	23	—	6 10 5
Cables & Wireless 5½% Pref.	Stock	5½	5½	54½	−4½	—
Do. A 7½% Ord.	,,	Nil	—	19½	−3	—
Do. B Ord.	,,	Nil	—	11	−1	—
Globe Tel. and T. Ord.	10	10	8½	9	−1	—
Do. do. Pref.	10	6	6	9	—	6 13 4
Great Northern Tel.	10	20	20	22½	−2	8 17 10
Marconi-Marine	1	15	15	35	−½	8 11 5
Oriental Telephone Ord.	1	12	12	2½	—	*5 13 0
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	5	5½	—	6/3	—	—
Do. do. 2nd Pref.	5	6	—	6/3	—	—
Do. do. 5% Deb.	Stock	5	5	12½	—	—
British Electric Traction Def. Ord.	,,	5	5	850	−25	—
Do. do. Pref. Ord.	,,	8	8	122	—	6 11 2
Brazil Traction	100	8	—	14¼	+¼	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	90½	—	5 10 6
London & Sub. Trac. 5% Pref.	1	Nil	Nil	9/3	—	—
London United Tram Deb.	Stock	4	4	57½	—	6 19 2
Mexico Trams, 5% Bonds	—	5	5	27½	—	18 3 3
Mexican Light Common	100	Nil	Nil	25	—	—
Do. 7% Pref.	100	7	7	35	—	20 0 0
Do. 1st Bonds	—	5	5	62	—	8 1 4
Victoria Falls Ord.	1	15	15	57/6	−¼	5 4 4
Yorkshire (West Riding)	1	Nil	Nil	6/3	—	—
MANUFACTURING COMPANIES						
Assoc. Elec. Ord.	1	6	6	20/9	−3/-	5 15 3
Do. Pref.	1	8	8	27/6	—	5 16 5
Babcock & Wilcox	1	15	14	48/9	−¼	*5 14 10
British Aluminium Ord.	1	10	10	26/3	−½	7 12 5
British Insulated Ord.	1	15	15	2½	—	5 2 2
Brush Ord.	Stock	10	5	70	−5	7 2 10
Callender's	1	15	15	2¾	−¼	5 9 1
Do. 6½% Pref.	1	6½	6½	23/9	—	5 9 5
Crompton Parkinson Ord.	5/-	30	30	22/6	—	6 13 4
Do. 8% Pref.	1	8	8	28/3	—	5 13 3
Edison-Swan 1st Pref.	1	7½	7½	23/3	—	6 9 0
Do. 5% Deb.	Stock	5	5	91½	—	5 9 3
Electric Construction	1	5	Nil	10/-	−½	—
Enfield Cable Ord.	1	25	25	4¼	−1/16	6 3 1
English Electric	1	Nil	Nil	10/-	—	—
Do. do. Pref.	1	Nil	Nil	8/9	—	—
Ferranti Pref.	1	7	7	21/3	—	6 11 9
G.E.C. Pref.	1	6½	6½	24/6	—	5 6 1
Do. Ord.	1	14	10	40/9	−4/3	4 18 0
Henley's	1	30	30	5½	−½	5 14 3
Do. 4½% Pref.	5	4½	4½	4	−½	5 12 6
India-Rubber	1	Nil	Nil	6/3	—	—
Johnson & Phillips	1	10	10	27/-	—	7 4 1
Siemens Ord.	1	7½	7½	23/3	—	6 9 0
Telegraph Construction	12	10	7½	13	—	6 18 6

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specification will be printed and abridged and all subsequent proceedings will be taken.

1930.

1,096. "Telephone systems." L. Mellersh-Jackson (Telefonaktiebolaget L. M. Ericsson). April 22nd, 1930. (Convention date not granted.) (360,354.)

13,757. "Device for reducing armature reaction in dynamo-electric machines of the homopolar type." B. C. Von Platen. May 3rd, 1929. (360,418.)

13,823. "Electric discharge tubes." Edison Swan Electric Co., Ltd. May 4th, 1929. (360,419.)

14,339. "Electric controllers for printing-presses or the like." A. J. Cline. May 9th, 1930. (360,445.)

16,733. "Mercury-vapour electric discharge devices with two cooling systems." F. Lutz. June 29th, 1929. (360,407.)

17,077. "High-frequency transformers or coupling-coils." H. G. Maerlender and H. A. Maerlender. May 31st, 1929. (360,423.)

17,434. "Luminescent gas discharge tubes." Claude Neon Lights Inc. June 26th, 1929. (360,446.)

22,111. "Method for the manufacture of insulating bands." L. Mellersh-Jackson (Siemens Schuckertwerke Akt.-Ges.). July 22nd, 1930. (360,454.)

22,587. "Electric follow-up systems for precision instruments, such as gyroscopic compasses." Sperry Gyroscope Co., Ltd. July 27th, 1929. (360,428.)

22,781. "Electric hand-lamps." E. S. Conradi. July 29th, 1930 (Cognate application 38,861/30.) (360,370.)

22,830. "Electric protective arrangements." British Thomson-Houston Co., Ltd., and F. J. Lane. July 29th, 1930. (360,455.)

22,857. "Telephone and like electric cables." Hackethal-Draht-und Kabel-Werke Akt.-Ges. July 29th, 1929. (360,456.)

22,931. "Gasfilled electric discharge vessels." W. L. W. Schallreuter. July 30th, 1930. (360,362.)

23,112. "Electric adjusting-devices for the hands of clock mechanisms." C. Rosat, O. J. Moser, and P. Reymond. August 12th, 1929. (360,413.)

23,218. "Electron-discharge tubes." Standard Telephones & Cables, Ltd., and L. H. Bedford. August 1st, 1930. (360,433.)

23,243. "Electric heating units." S. le F. Varvel and W. L. Meade. August 1st, 1930. (360,434.)

23,361. "High-frequency amplifying systems." Marconi's Wireless Telegraph Co., Ltd., and H. J. Round. August 2nd, 1930. (360,463.)

23,368. "Photo-electric devices." M. A. E. Pressler. August 5th, 1929. (360,416.)

23,454. "Automatic electric regulators." British Thomson-Houston Co., Ltd. August 3rd, 1929. (360,465.)

23,515. "Electric switchgear." A. Reyrolle & Co., Ltd., A. Allen, and J. Christie. August 6th, 1930. (Cognate application 15,485/31.) (360,497.)

23,529. "System and apparatus for the electrical production of images." Communication Patents, Inc. October 7th, 1929. (360,470.)

23,594. "Alternating-current motors." British Thomson-Houston Co., Ltd., and A. F. Heinrich. August 6th, 1930. (360,439.)

23,653. "Regenerative cable repeaters for telegraph systems." A. F. Connery and International Communications Laboratories, Inc. August 7th, 1930. (360,474.)

23,655. "Electric relays." L. H. Peter, E. W. Challans, R. M. MacGregor, and Westinghouse Brake & Saxby Signal Co. August 7th, 1930. (360,475.)

23,796. "Contact members of plug-and-socket connectors." A. F. Harmer and G. M. Harmer. August 8th, 1930. (360,485.)

24,103. "Method for localising faults in multicore cables." W. U. Dykes (Hartmann & Braun Akt.-Ges.). August 12th, 1930. (360,498.)

24,118. "Electric signalling systems." Landis & Gyr Soc. Anon. September 2nd, 1929. (360,499.)

24,384. "Cathode-ray compasses." International General Electric Co., Inc. August 16th, 1929. (360,508.)

24,512. "Electric supervisory control systems." British Thomson-Houston Co., Ltd. August 16th, 1929. (360,515.)

24,645. "Combined electric rotary switch and fuse." G. Mills. August 18th, 1930. (360,519.)

24,979. "Protective arrangements for electricity distribution systems." H. E. Dance. August 21st, 1930. (360,527.)

25,167. "Electrical switchgear." H. Birkinshaw and Associated Electrical Industries, Ltd. August 22nd, 1930. (360,531.)

25,999. "Electric water-heaters, boilers, and the like." F. de T. Craven. August 30th, 1930. (360,542.)

27,169. "Clamps for suspending overhead electrical conductors." Steatite & Porcelain Products, Ltd., and C. R. Lown. September 11th, 1930. (360,564.)

27,190. "Electrical compensator for the directional transmission or reception of wave energy." Electroacustic Ges. November 21st, 1929. (360,565.)

27,874. "Electric heating apparatus." R. A. Jackson. September 18th, 1930. (360,571.)

29,497. "Electric power supply systems." General Electric Co., Ltd., W. Wilson, and R. Willoughby. October 2nd, 1930. (360,593.)

29,787. "Electric signalling systems." H. Whitehall. October 6th, 1930. (360,595.)

30,029. "Supports for electric heating resistances." H. Wade (Siemens-Schuckertwerke Akt.-Ges.). October 7th, 1930. (360,600.)

30,191. "Cable boxes." Telefonaktiebolaget L. M. Ericsson. March 24th, 1930. (360,603.)

30,356. "Ceiling rose for electric pendants and the like." W. J. Bishop. October 10th, 1930. (360,606.)

30,583. "Electric generating systems." E. X. Schmidt and W. O. Baer. November 2nd, 1929. (360,609.)

31,399. "Automatic telephone systems." Siemens Bros. and Co., Ltd., and R. G. Dixon. October 20th, 1930. (360,627.)

31,442. "Thermionic amplifiers." Marconi's Wireless Telegraph Co., Ltd. October 18th, 1929. (360,630.)

32,635. "Cathode-ray tubes." P. E. L. Chevalier. October 30th, 1930. (360,654.)

32,714. "Electric liquid-heaters." Santon, Ltd., and H. C. Sanders. October 31st, 1930. (360,655.)

32,950. "Electromagnetic direction-finders." Perryman Electric Co., Inc. November 2nd, 1929. (360,660.)

33,160. "Apparatus for directional illumination." General Electric Co., Ltd., and E. L. Randall. November 4th, 1930. (360,664.)

33,572. "Electrical instruments." Park Royal Engineering Co., Ltd., and W. R. Matthews. November 7th, 1930. (360,673.)

33,935. "High-tension protecting-devices for X-ray installations." C. H. F. Muller Akt.-Ges. November 12th, 1929. (360,678.)

34,083. "Coupling arrangements comprising amplifying tubes." Naamlooze Vennootschap Philips Gloeilampenfabrieken. May 19th, 1930. (360,679.)

35,073. "Control of a.c. motors and their supply circuits." Electrical Improvements, Ltd., and A. H. Human. November 21st, 1930. (360,687.)

35,441. "Hollow stranded conductors for electrical high-tension lines." Felten & Guilleaume Carlswerke Akt.-Ges. November 25th, 1929. (360,693.)

35,571. "Automatically regulated electric battery-charging systems." A. H. Midgley. November 26th, 1930. (Addition to 339,672.) (360,694.)

36,049. "Television apparatus." L. M. J. Luiseau and Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. November 29th, 1929. (Addition to 358,087.) (360,699.)

36,405. "Electrical fuses, switches and the like." J. A. Crabtree. December 3rd, 1930. (360,706.)

36,525. "Electric insulators." General Electric Co., Ltd., and S. W. Richards. December 3rd, 1930. (360,708.)

36,927. "Electric junction-box." E. W. Faithfull. December 8th, 1930. (360,712.)

37,284. "Three-electrode valves." A. Salomon and Frey-Radio-Ges. December 10th, 1929. (360,715.)

37,803. "Regulators for electric machines." International General Electric Co., Inc. December 14th, 1929. (360,719.)

38,198. "Controllers for electric motors." P. B. Harwood and J. M. Newman. December 26th, 1929. (360,722.)

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46. "Accumulating electrical water-heater." O. Stalhane and H. Svensson. January 1st, 1931. (360,734.)

4,447. "Valves for pressure-operated electric switches." International General Electric Co., Inc. February 12th, 1930. (360,767.)

7,851. "Resilient contact for electric switches, fuses, automatic switches, plug-and-socket devices, lamps, i.e., for all circuit-making and circuit-breaking devices." W. J. A. Roosen. March 15th, 1930. (360,784.)

11,662. "X-ray installations." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 30th, 1930. (Addition to 310,001.) (360,802.)

12,304. "Process for the manufacture of cathodes for electric discharge tubes." Vereinigte Gluhlampen und Electricitats Akt.-Ges. April 25th, 1930. (Addition to 289,763.) (360,803.)

15,216. "Electric vibratory razors." Telephon-Apparat-Fabrik E. Zwietusch & Co. Ges. June 5th, 1930. (360,810.)

17,735. "Radio-receivers and amplifiers for use therein." Marconi's Wireless Telegraph Co., Ltd. June 18th, 1930. (360,813.)

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from November 25th :—

Pilot. No. 523,766. Class 8. Electric dimming switches.—Horstmann Gear Co., Ltd., 93, Newbridge Road, Bath.

Protexo. No. 525,977. Class 8. Combined switches and lightning arresters for use in radio receiving sets.—H. S. Cooke, 168, Hampton Street, Birmingham.

Chasseket. No. 526,704. Class 8. Radio instruments and apparatus, electric gramophones, etc.—Six-Sixty Radio Co., Ltd., 17-18, Rathbone Place, Oxford Street, W.1.

Meco (lettering and design). No. 522,243. Class 13. Electrical cut-outs, contacts, terminals, switches, etc.—Mining Engineering Co., Ltd., Bromyard Road, Worcester.

Lectruc (lettering and design). No. 526,465. All goods in Class 22.—Wingrove & Rogers, Ltd., Mill Lane, Old Swan, Liverpool.

Pipe line, station and Loch Rannoch

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Reconstruction of Electric Theatre (2,300 seats) with talkie apparatus, etc.; the manager, Union Street.

Amersham (BUCKS).—Houses (38), Mill Lane, for the R.D.C.; Kemp & How, architects, 4, Bloomsbury Square, W.C.1.

Bedford.—Depôt (£13,000), for the T.C.; C. A. White, builder. Additions, Girls' Training College, Park Road North; Stonebridge & Harris.

Belper (DERBY).—Sewage disposal works; C. J. Lomax & Son, chartered civil engineer, 37, Cross Street, Manchester.

Berwick-on-Tweed.—Reconstruction of business premises, High Street and West Street, for H. Stuart, draper.

Birkenhead.—Housing scheme, Higher Bebington golf course; borough engineer.

Bishop Auckland.—Extensions to sewage disposal works; J. Ford, surveyor.

Bournemouth.—Development of Wick House estate; T. S. Lander.

Brandon (DURHAM).—Additional sewage disposal works, for the U.D.C., (£2,000); J. P. Addison, surveyor, Langley Moor, Durham.

Bridlington (YORKS).—Houses (56), for W. H. Whitting; C. L. Waite, architect, Canton Villa. Waterworks; borough engineer.

Camborne (CORNWALL).—Houses (54), for the U.D.C.; surveyor.

Cannock (STAFFORD).—Sewage disposal works, Heath Hayes; U.D.C. surveyor.

Cheltenham.—Clearance scheme, Swindon Passage area; borough engineer.

Coatham (YORKSHIRE).—Extensions to the Catholic Day School; Kitching & Co., architects, 21, Albert Road, Middlesbrough.

Cockermouth (CUMBERLAND).—Reconstruction of the Bassenthwaite Sewage Disposal Works for the R.D.C.; S. E. Simpson, engineer, Council Offices.

Crayford (KENT).—Flour mill extensions, The Creek, for H. W. Richards.

Denbighshire.—Technical centre at Llanrhaiadra (near Oswestry), for the county E.C.; W. F. Humphreys & Co., builders, Acrefair, Wrexham.

Downham Market (NORFOLK).—Reconstruction of Poor Law Institution for the Norfolk C.C.; C. J. Norton, Stracey Road, Norwich.

Dudley.—Church, Priory estate (£4,450), with electrical and central heating work; M. Round & Sons, Ltd., builders.

Ealing.—Block of flats, Park Hill and King's Road; W. H. Read & Co., architects, 42, Haven Gardens.

East Looe (CORNWALL).—Alterations to business premises, Castle Street, for E. Middleton; G. L. Cook, architect, Fore Street.

Edgware (MIDDLESEX).—Extensions to Redhill Hospital (£50,000); county architect.

Edinburgh.—Additions to James Clark School (£6,000); city architect.

Enfield.—Rebuilding Pearson's premises, Market Place; W. J. Lewis, architect, Ilford. Conversion of White Webbs (mansion) to institution (£3,000); county architect.

Epsom.—Pumping station, etc., for the R.D.C.; J. Taylor & Sons, engineers, Caxton House, Westminster, S.W.1.

Essex.—Technical college, Barking, for the county E.C.; J. Stuart, county architect, Chelmsford. Schools, Beacontree Heath and Woodford; director of education, Chelmsford.

Farnborough (HANTS).—Chapel, Hillside Convent; A. G. Scott, architect.

Garstang (LANCS).—Houses (88); R.D.C. surveyor.

Gateshead-on-Tyne.—Housing schemes, Split Crow Road, Hill Road, and Salt Meadows, for the T.C.; E. H. Paterson, borough engineer, Town Hall.

Glasgow.—Houses (904) and hostel, Carntyne; D. Stenhouse, town clerk. Premises for R.C. Archdiocese, Whitevale Street; Gillespie, Kidd & Coia, architects. Shops, Central Station, Gordon Street; L.M.S. Estates Department.

Greenock.—Central reconstruction scheme (£300,000); burgh engineer.

Hampshire.—Boys' secondary school, Farnborough (£30,000), for the county E.C.; director of education, Winchester.

Hartshill (STAFFS).—Surgery block for Royal Infirmary, Princess Road; governors.

Huddersfield.—Extensions, Royal Infirmary, with electric bed and passenger lift; T. Bottomley & Son, builders, Lindley.

Irish Free State (DUBLIN).—Flats (72), Mary's Lane (£27,894); H. & J. Martin.

Kent.—Nurses' home, Tonbridge Poor Law Institution, for the C.C.; W. H. Robinson, architect, Springfield, Maidstone. Extensions, casual wards, Minster-in-Thanet (£4,500), for the Public Assistance Committee; county architect, Maidstone.

Lancaster.—Houses (50), Rylands estate (£14,265); Nicholson & Wright, Ltd.

Launceston.—Alterations and additions to post office; H.M. Office of Works, King Charles Street, S.W.1.

Lincolnshire.—Casual wards, Sleaford (£7,000), and extensions, Stamford casual wards (£3,000), for Kesteven C.C.; county surveyor, Sleaford.

London (BLACKHEATH).—Extensions of White Line Laundry, Blackheath Hill; H. S. Davis. (CHELSEA).—Alterations to offices, Sloane Square and Ixworth Place; Michelin Tyre Co., Ltd. (CHISWICK.)—Alterations, White Building, Barley Mow Passage; Alliance Assurance Co., Ltd. (FINCHLEY.)—Alterations and additions, Assembly Works, Woodside Lane; Fraser & Glass. Shops (10), Holders Hill Road; Baldwin & Co. (Finchley), Ltd. (HOLBORN.)—Structural alterations, Smithfield Institute; L.C.C. architect. (HOLLOWAY.)—Employment exchange; H.M. Office of Works, King Charles Street, S.W.1. (ISLINGTON.)—Extensions to 49, Copenhagen Street for Maconochie Bros., Ltd.; C. P. Duckering. (NEW CROSS.)—Registrar's offices, Amersham Road; Deptford borough engineer. (PECKHAM.)—Cinema, Peckham Hippodrome site, for the Gaumont British Picture Corporation; F. T. Verity, architect, 7, Sackville Street, W.1. (POPLAR).—Public baths, East India Dock Road; borough engineer.

Manchester.—Ice skating rink, Norman Road, Rusholme; J. Knight, architect, 5, Cross Street. Shops, Victoria estate, Blackley (£3,100); city architect.

Melton Mowbray.—Methodist Church, Asfordby Hill; trustees. Schools (£42,575); Orton & Co., builders, Coalville.

Middlesbrough.—Reconstruction of "Acklam Hall" as a new secondary school for the T.C.; S. E. Burgess, engineer, Town Hall. Schools, Whinney Banks, Marton Grove, and Brambles Farm estate, for the T.C.; S. E. Burgess, engineer, Town Hall.

Middlesex.—New secondary school, Mutton Lane, South Mimms, and conversion of premises, Hampton, Teddington, and Ashford, to children's homes; county architect.

Mitcham (SURREY).—Congregational Church; S. Dale, builder.

Morecambe.—Structural alterations, Astoria Cinema; licensee. Shop, Lancaster Road; Lancaster Co-operative Society.

Newbury.—Shops, granaries site; A. J. C. Cooper, architect, 41, Cheap Street.

Newcastle-on-Tyne.—Completion of St. Luke's Church (£3,000); Rev. R. Hall, the vicar. Cinema, Haymarket, for D. Scott, North Shields. Conversion of "Elswick Grange" into hospital wards; F. H. Holford, city architect, Town Hall. Alterations to the British Lion Hotel; F. E. Dotchin, architect, 46, Grainger Street West. Alterations to the Market Lane Hotel, Pilgrim Street; J. W. Taylor, architect, St. John Street.

Newton-in-Makerfield.—Houses (100), for the U.D.C.; surveyor, Earlestown. Sewage disposal works (electric pumping equipment); Elliott & Brown, chartered civil engineers, Burton Buildings, Parliament Street, Nottingham.

Northfield.—Houses (20), for F. Fisher, Norwich.

North Shields.—Shops and flats, Heaton Terrace; G. A. Leck, builder, Field House.

Northumberland.—School, Broomhill, for the C.C.; W. W. Tasker, architect, 17, Claremount Road, Newcastle-on-Tyne.

Norton (YORKS).—Houses (40), for the U.D.C.; surveyor.

Orsett (ESSEX).—Houses (20), for the R.D.C.; surveyor, Grays.

Oxford.—Waterworks, Swinford, for the T.C.; Sir Alex. Binnie, Son & Deacon, engineers, Artillery Row, S.W.

Oxfordshire.—Casual ward extensions, Chipping Norton, for the C.C.; G. T. Bennett, county surveyor, 8, New Road, Oxford. School (250 places), Kidlington (£3,500); R. F. Dodd, architect, 119, St. Aldate's Street.

Petersfield (HANTS).—Houses (40), with electrical work, for the R.D.C.; D. A. Thomas, surveyor.

Pinner.—Development of building estate, Cannon Lane; Mr Cutler.

Ramsbottom (MANCHESTER).—School, Stubbins; vicar of St. Philip's.

Rotherham.—Housing scheme, Fizwilliam Road; borough engineer. Church, Clifton (£8,000); J. E. Knight & Co., architects, 48, Moorgate.

Rushden (NORTHANTS).—Residences, Wellingborough Road; W. Packwood & Sons, builders, 80, Newton Road.

Ryton (DURHAM).—Installation of electricity in 24 houses at Greenside; U.D.C. surveyor.

Shardlow (DERBYSHIRE).—Sewage disposal schemes; Melbourne and Chaddesden, with automatic electric pumping stations, for the R.D.C.; Elliott & Brown, engineers, Burton Buildings, Parliament Street, Nottingham.

Sheffield.—Church, for the trustees of the Richmond Wesleyan Reform Church; J. Moir, builder, 444, Fulford Road, Broomhill. Alterations and additions to Ecclesfield Police Station; West Riding, architect, County Hall, Wakefield.

Slough.—Houses (80), Furnival Avenue, for the U.D.C.; A. Bromly, surveyor, Council Offices, William Street.

Smethwick (STAFFS).—Shops, Norman Road; J. Reece.

Southampton.—Improvements at West Station (£170,000) for the Southern Railway Co.

South Shields.—Houses (504) for the T.C. (£171,000), and secondary school (550 places) for the E.C.; J. P. Watson, borough engineer, Town Hall.

Stanley (DURHAM).—Houses (100); U.D.C. surveyor.

Stoke-on-Trent.—Houses (22), Holden Farm estate; Shenton Bros. Development of estate, Hanley Road, Sneyd Green; A. W. Moss, architect.

Sutton (SURREY).—Church, St. Helier estate (£5,000), with heating and lighting work; Ekins & Co., builders, Hertford.

Thakeham (SUSSEX).—Water supply scheme, Storrington, with pumping station and plant, for the R.D.C.; H. B. Nichols, engineer, 13, Victoria Street, Westminster, S.W.

Todmorden (LANCS).—Waterworks, Heptonstall, for the R.D.C.; H. C. Ritchie & Partners, engineers, Royal Liver Buildings, Liverpool.

Torquay.—Shops for the Torquay and District Co-operative Society, Ltd.; H. C. Powell, architect, 3a, Higher Terrace.

Twickenham.—Petrol station, office and store, Whitton Road; Willment Bros. Houses (58), Warren and Nelson Roads, and shops with flats over, Percy Road; H. M. Grellier & Son, architects.

Tynemouth.—Houses (299) for T.C.; J. L. Beckett, surveyor, Howard Street, North Shields.

Urmston (MANCHESTER).—Eight shops, Station Road and Higher Road, for W. E. Restall; W. Longworth, architect, 4, St. Mary's Parsonage, Manchester.